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# SUGAR y AZUCAR

*Volume 56 No. 3 March 1961*

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**COVER** *The abstract rendering of sugar cane leaves and stalks by Jack Brown on this month's front cover suggests the interesting fact that at this very moment cane is being planted, is growing and is being harvested in various parts of the world.*

**PORTADA** *La interpretación abstracta de las hojas y tallos de la caña de azúcar dibujadas por Jack Brown en la portada de la edición del presente mes, sugiere la interesante realidad que en éste preciso momento la caña se siembra, crece, se cultiva y se cosecha en distintas partes del mundo.*

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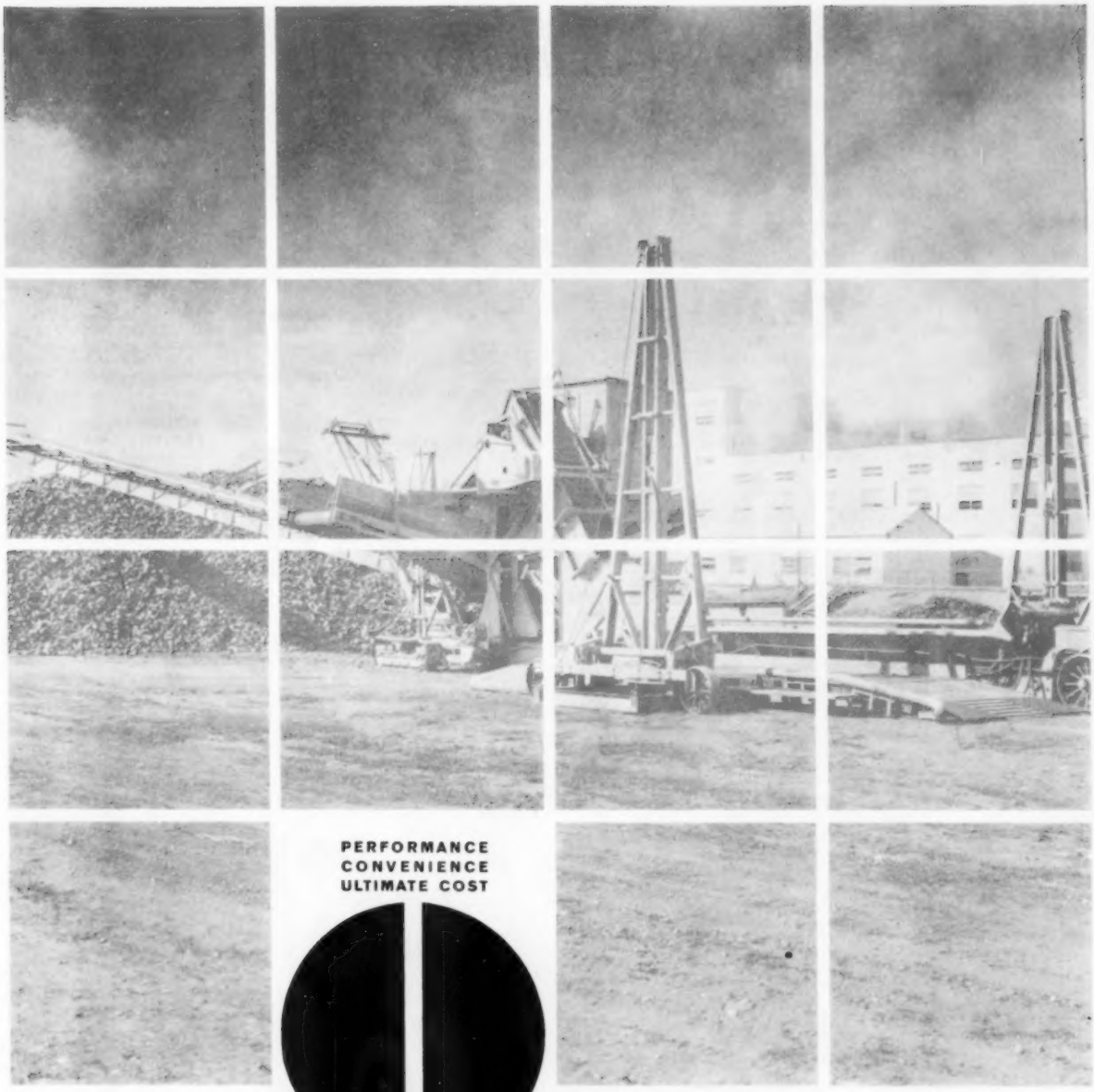

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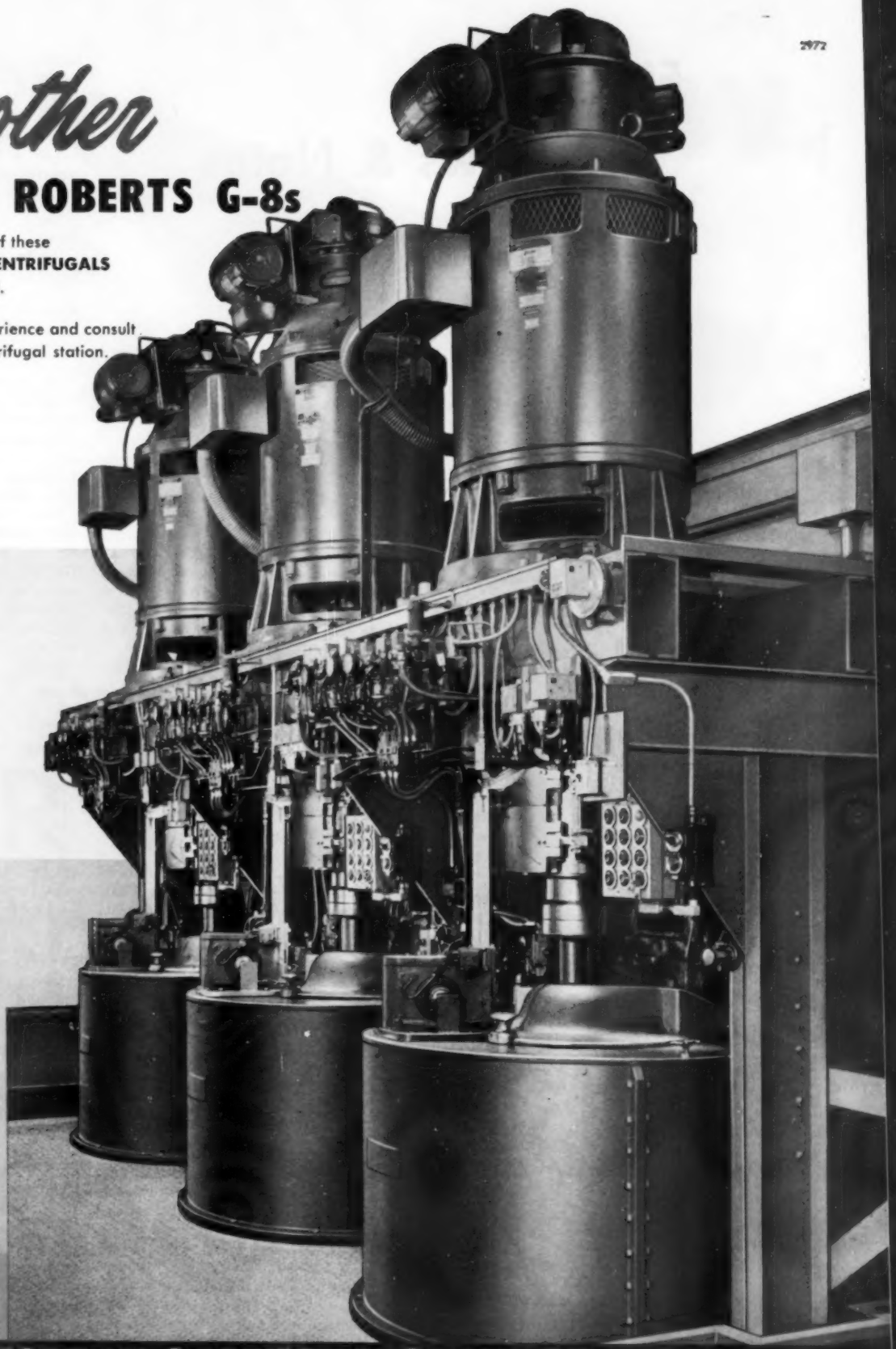

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# EUROPEAN News & Notes

## By our London Correspondent

It is good to be able to report that plans for holding the first joint meeting of the Institut International de Recherches Betteravieres and the American Society of Sugar Beet Technologists in England are well in hand. This is to be incorporated with the IIRB's normal summer meeting, and it will be the second it has held in England since its formation in 1931.

The proceedings—which will last from May 15 to 19—will include visits to the National Sugar Beet Spring Demonstration and to several research stations. There should be a great deal that is new to be seen at this demonstration in view of the fact that the autumn demonstration had first to be postponed because of the waterlogged conditions, and eventually abandoned as a safety measure because of widespread foot-and-mouth disease.

Despite difficulties of harvesting and transport through continued wet weather, British Sugar Corporation's 18 factories have continued to be kept well supplied with beet in good condition, and by mid-January about 5.6 million long tons had reached them. It was generally considered they would be kept busy probably all February.

The latest crop estimate is 6,800,000 tons of beets, a record for Britain. According to the Agricultural correspondent of *The Times*, the national average yield is put at 16¾ tons to the acre, which is in line with the best Europe can do.

As to sugar production, factory tests indicate Root weight averaged 782 gr. on January 9, 1961 compared with 649 gr. on the same date in 1960. Sucrose content at 15.14% was slightly lower this year than 17.09% on January 9, 1960.

A government report on talks between the agricultural departments and the farmers' unions states that the scope for UK sugar beet production is limited by the existing factory capacity.

These talks were the result of criticism by the National Farmers' Union of the government's last price review, and the concern it expressed as to the effect the development of closer trading relations with Europe might have on the future of the farming industry.

In regard to sugar beet, the report goes on to say that factory modernization is increasing their ability to take up the additional yield arising out of the existing acreage. No new factories are contemplated, it says, because of the UK's commitments to the Commonwealth, which are firm to 1968 and are open to extension.

Tate and Lyle was fifth and British Sugar Corporation ninth in order of net assets in 1957 in the "food manufacturing" group of UK companies. This is shown in a Board of Trade survey—"Company Assets and Income in 1957"—covering all firms engaged in manufacture and distribution with £1 million net assets or more and whose shares are quoted on a UK stock exchange.

Four sugar companies are mentioned in the food manufacturing group of 75 and the details given are:

| Company | Net assets at end of "year" 1957 £ mill | Ranking | % of end 1954 assets | Income in "year" 1957 £ mill | Ranking |
|---|---|---|---|---|---|
| Tate & Lyle | 28.02 | 5 | 113 | 5.76 | 5 |
| British Sugar Corporation | 13.19 | 9 | 105 | 1.09 | 22 |
| Manbré & Garton | 7.22 | 17 | 113 | 1.49 | 17 |
| Westburn Sugar Refineries | 1.50 | 39 | 116 | 0.26 | 44 |

The report and accounts of Tate & Lyle for the 52 weeks ended October 1, 1960, reflect throughout the purchase of control, at a cost of £6.4 million, of Canada & Dominion Sugar Co., Ltd., completed November 1959. This is a company with which Tate & Lyle has long had very close associations and a short history shows that it has been refining sugar since 1854, and from this has grown a business worth $32 million. For a number of reasons it did not have good trading results in its last trading year, but much improvement is now being seen and Tate & Lyle is confident the new link will prove of great benefit to both.

Group trading profit for the year was £5,661,901 *(against £5,069,631 for the 53 weeks in 1958/59)*; total income £5,795,934 *(£5,237,758)* and profit before taxation, £5,125,694 *(£4,709,389)*. After paying £2,717,344 *(£2,207,408)* in taxes net profit is left at £2,408,350 *(£2,501,981)*. Ordinary dividend paid to stockholders is maintained at 12%, after deducting tax.

The directors' report that the group trading profit includes £643,597 from Canada & Dominion for the six months to September 30, 1960—the first time the accounts have been consolidated—but warn that these profits, a substantial improvement over the year to March 31, 1960, should not be regarded as necessarily indicating a profit trend applicable to a 12-months' period.

Tate & Lyle's refined product sales are reported thus:

| | 1959/60[a] Tons | % | 1958/59[b] Tons | % |
|---|---|---|---|---|
| Home Trade | 1,458,170 | 73 | 1,534,395 | 73 |
| Export | 527,327 | 27 | 579,270 | 27 |
| Total | 1,985,497 | 100 | 2,113,665 | 100 |

[a] 52 weeks. [b] 53 weeks.

An interesting analysis is given of the make-up of Tate & Lyle's total income of £134,762,692, equivalent to 7.00 d/lb of sales and comprising export sales £33,843,242 (including £14,178,224 duty and levy drawback, etc.), and home trade sales and other income £100,919,450.

This 7.00 d/lb is made up of 6.75d (£129,835,997) for expenses, of which by far the biggest proportion—5.62 (£108,078,730, including £48,455,874 duty and levy)—is represented by raw materials.

Trading profit represents but 0.25d (£4,926,695), made up thus: taxation, 0.12d (£2,403,277); placed to reserves, 0.06 (£1,141,592): and only 0.05d per pound of sales (£1,074,546 net) went as dividends to stockholders.

Another annual review to be issued recently is that of the Antigua Sugar Factory Ltd. and its subsidiary, Antigua Syndicates Estates Ltd. The former returns a profit of £3,691 for the year ended August 31, 1960, against a profit of £87,967 in 1958/59, and the Estates company a loss of £164,277. The consolidated group result is a loss of $162,586 after providing £2,000 for Antigua taxation against a profit of £50,476 the year before. As a result the balance carried forward is now a debit of £64,669, against a credit of £97,917 brought in, and no dividend is paid, against 5%, tax free, for 1958/59.

Canes ground totalled 182,631 tons against 272,501 tons, and the sugar made was 20,154 tons against 31,789 tons. The 1959/60 export sugar total was 18,338 tons, less than that provided in the company's price quota. Thus it had no free sugar for disposal on the open market. The negotiated price quota, was sold to the sugar

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board at £44.8s.10d. cif, including £2.15s.0d. a ton payable as Special Funds.

The Chairman—M. S. Moody Stuart—stresses in his review the degree to which the crop was affected by two delaying factors—the weather being far worse than expected and the long drawn-out argument about cane cutter's wages before work could be started. Both in size and quality of juice the crop was disappointing, he says, and this explains the heavy fall in cane price from 1958/59.

The following additional crop results are given:

| | 1960 | 1959 |
|---|---|---|
| Sucrose in Cane % | 12.71 | 13.06 |
| Fibre in Cane % | 17.43 | 16.56 |
| Sucrose in Bagasse % | 2.38 | 2.37 |
| Purity of Juice % | 82.80 | 84.36 |
| Mill Extraction Sucrose % | 93.62 | 94.20 |
| Boiling house Recovery Sucrose % | 89.07 | 91.14 |
| Total sucrose recovery % | 83.38 | 85.85 |
| Yield of sugar 96° pol, % | 11.04 | 11.68 |
| Tons cane per ton of sugar, 96 pol | 9.06 | 8.56 |
| Net price of sugar per ton (aver.) | £40.19s.1d. | £40.8s.3d. |

The chairman also reports that field loading is being mechanized in an effort to speed up cane deliveries. After protracted negotiations it was agreed to modify payment for canes as suggested by Prof. Rottenberg following a commission of inquiry on this subject. This is reflected in the year's accounts.

THE Colonial Development Corporation in London announces that a good start has been made with the early development stages of the Kilombero Valley project in Tanganyika to grow and refine sugar on a 25,000-acre estate. An initial nursery of 300 acres has already been started.

This project was launched in Tanganyika last June by a group comprising International Finance Corporation, Colonial Development Corporation, The Netherlands Overseas Finance Co. and Vereenigde Klattensche Cultur Mij. These agreed to form Kilombero Sugar Co. and to contribute jointly £2.3 million towards a total estimated cost of $3.2 million. The company obtained long-term credit from an equipment supplier and a preference share issue was to provide the balance.

This took the form of a public issue in Tanganyika of 700,000 preference shares of 20s. each and the Colonial Development Corporation now announces that 746 applications were received for 35,870 shares. The issue was underwritten by the corporation and the Standard Bank of South Africa, and this group hopes to further opportunities for the local purchase of these shares at an early date.

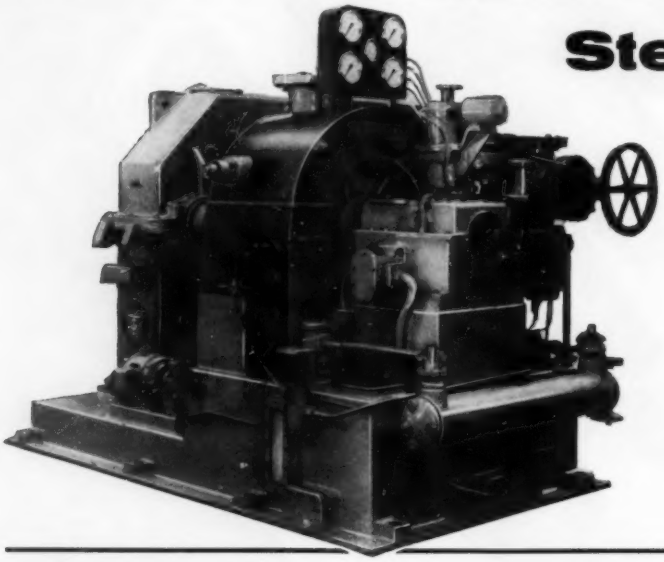
The last of the Royal Institute of Chemistry's monographs for 1960—No. 5: "Sugar and its Industrial Applications," by Dr. L. F. Wiggins (director of research and development, Aspro-Nicholas Ltd.) — is worthy of note for its interest and wide scope.

Divided into two main sections—(a) Sugar as a chemical, and (b) Sugar cane by-product utilization—with a bibliography of 150 references up to 1959, this report presents an excellent survey of the current state of industrial applications. It affords ample avenues for thought.

It is not generally realized that the world's annual sucrose production (some 57 million tons in 1961) is by far the largest amount of any pure organic chemical made in any industry.

Commenting on the state of the world market for sugar, Dr. Wiggins says that if new uses for sugar could be found, price fluctuations would be less severe and a steadier economy would be produced in the sugar industry. Therefore, he argues, it is clear why a great effort should be made to look into the chemistry of sugar with a view of finding new and useful derivations from it. Further, it is reasonable to assume that if the potential of sugar could be increased by the invention of larger non-food uses, then more land could be cultivated economically and even greater amounts of sugar produced annually.

This 44-page report is available from the Institute at 30 Russell Square, London W.C. 1, price 5s.6d. net.

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# SUGAR *Machinery*

The illustration shows a modern 15 Roller 35" x 72" Sugar Cane Milling Plant with individual Turbine Drives recently supplied to Deep River Beau Champ Ltd., Mauritius. The average grinding capacity figure for the 1958 crop was 103 tons canes per hour. Extraction 96.2%. Cane fibre content 12.5%.

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# FIELD MECHANIZATION SECTION

SUGARMEN in Hawaii say they are "extremely pleased" with results of recent experiments with the new cut-load cane harvester which is in pilot operation by the Field Engineering Section of the Hawaiian Sugar Planters' Association. Reports were made on the machine at the annual meeting of HSPA in December and the first picture released. (see illustration on this page.)

The cutting rate of the new machine, which has been dubbed both the "Mighty Midget" and "No. 29"—as it is the 29th cane harvester developed in the Hawaiian industry—is one ton per minute. R. A. Duncan, chief engineer of the HSPA Experiment Station, says it is hoped to increase the cutting rate to two tons per minute. It has been found that the chopped cane, cut by the harvester, has a density of 15 to 16 lbs./cu. ft. in transport unit, which operates alongside the cutter.

Dr. John H. Payne, principal technologist of the HSPA Experiment Station, told members of the Hawaiian Sugar Technologists that the new harvester eliminates most of the field trash and soil from the stalks. Operations at Oahu Sugar Co., late in 1960, showed that the cane harvested by the new cutter arrived at the mill with only 8% trash, compared to the average of 41% trash by conventional Hawaiian harvesting methods.

There were no problems in milling the cane, despite elimination of the cane cleaning operation—which is normal procedure in Hawaii. Dr. Payne said, another big advantage is that less than one-half of one percent sucrose was lost between field and factory, compared with an average of six percent loss normally suffered as a result of splintered and broken stalks.

Dr. Payne cautioned the technologists, however, that the experiments were made in ideal weather and on irrigated land under dry conditions.

Modifications are being made on the machine for tests in unirrigated areas, where operations will be undertaken under wet conditions.

The machine is unique for a Hawaiian design. It is the lightest weight harvester yet developed and is designed to fit into a standard power unit, either track-laying on wheel. It cuts the cane at ground level and chops stalks into about 18-inch lengths. The pieces are elevated onto a conveyor, passing through two air blasts which eliminates a high percentage of the trash and dirt. The cane pieces are then dropped into a road transport unit which moves alongside the harvester.

Cost of the new unit will be much lower than any other previous harvester designed in the Hawaiian industry. It is estimated that commercial models will be sold for about $40,000; the project, however, is still some distance away from mass production.

*This is the first photo released by the Hawaiian Sugar Planters' Assn. of its new cane harvester, dubbed "No. 29" and the "Mighty Midget." It is a cut-load design and mounts on a track laying or wheel-type prime mover.*

PATTERN of cane farming in Australia, world's fourth largest sugar cane producer, is changing due to the emphasis being placed on mechanization.

A recent survey of principal sugar producing districts in the state of Queensland, where most of Australia's cane is grown, showed there were 19,365 tractors in use. Figures compiled by the Department of Census & Statistics indicated 71,768 acres under irrigation in the 15 major sugar areas and 71,991 tons of fertilizer were used.

Some of the mechanical equipment used on the cane farms of Queensland include two types of toppers. The Massey-Ferguson-type tops cane while stalks are still standing. Cane is also topped on the ground after it has been hand cut and stacked in thin rows. Both side-mounted and rear-mounted toppers are in use. An *Australian Sugar Journal* representative reports on one belt-driven ground-type topper which handled 2,000 tons of cane last year.

Several types of front-end loaders have been developed to pick up hand-cut or machine-cut cane. Following the original design by George Quaid and Son, some 3,000 front-end loaders are now in use. At least one manufacturer puts out a loader having a capacity of 150 tons per day. More than 50 of this model are in operation.

The Bureau of Experiment Stations is tailoring new cane varieties to fit in with mechanization. New canes must possess anti-lodging qualities.

Australia is probably second to Hawaii in tonnage of mechanically harvested cane. About 30 harvesters were used in the last campaign. Massey-Ferguson appears to have the largest number of machines in operation. However, the Venton; Crichton; Fairymead (rotating blade and fixed shear blade); Scott; Truscott; and Creber & Sons Falkiner-type harvesters, are all machines operating in the fields of Australia.

Austrailan cane farms are relatively small in size, averaging about 50 acres. The industry spends about $1,250,000 on research annually, of which the government supplies only a small percent.

Highlight of the field mechanization effort is the cut-load pilot project being conducted at Mossman Central Mill Co. They started using one Massey-Ferguson harvester last year, cutting and loading directly into trailers in the field. This year, two machines will be operated on two shifts for discharge into 20-ton semi-trailers, especially designed for the job.

The Mossman operation proved so encouraging the first year that with modifications during the current season, which includes a cross-feed elevator on the harvester, it appears that the project is nearing commercial status.

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MECHANICAL harvesting of cane has attracted so much attention in the sugar industry that the tremendous growth in the use of airplanes in agriculture may have been overlooked. David W. Pratt, staff agriculturalist for American Factors Association in Honolulu, recently prepared a paper on the subject which appeared in *Sugar Research & Management*. He said:

The airplane is becoming one of the important tools of the sugar industry. In Hawaii, the plane is used primarily as a means of applying fertilizers and herbicides. Minor use is also made of the airplane for periodic observation of sugar cane fields and aerial mapping.

Basically, the airplane is popular because of its efficiency in applying both fertilizer and herbicides, as compared with tractor or hand applications. Aerial broadcasting of dry fertilizer mixes started in 1952. The use of granular mixes—particularly pelletized Urea with granular muriate—solved most of the problems previously encountered with liquid fertilizer application.

Some sugar plantaations, in wetter areas, have even found it advantageous to reduce their ground applications of fertilizer in favor of aerial application. But, the plane is usually used to supplement ground applications. The growing period of the crop can be extended, especially in two-year cane, by fertilizing from the air after the cane has closed in. Other methods are impractical at this time.

Puna Sugar Co. (formerly Olaa), an affiliated company of American Factors Associates, is one of the leaders in aerial fertilization in the Hawaiian sugar industry. They make three to four of their later fertilizer applications by air. Tests show the uniformity of application to be quite satisfactory.

Puna has fertilized as many as 480 acres, at the rate of 250 pounds per acre, in less than seven hours. This is more than eight times faster than a tractor using a fertilizing spreading device, and many times faster than hand application.

Three of American Factors Associates' affiliated companies are using aerial applications of herbicides for pre-emergence weed control. Oahu Sugar Co., Pioneer Mill Co. and Puna Sugar Co. are presently using four pounds of CMU (active) in five to ten gallons of water per acre. Tests show that the airplane application of herbicide is more uniform than that applied by either tractor or hand. The time required to treat one acre for pre-emergence weed control by air is almost one-tenth that of tractor application.

Recent meetings were held in Australia by the Mulgrave Mill Suppliers' Committee to investigate aerial spraying in weed control. As a result, they asked the Bureau of Sugar Experiment Stations to conduct tests to determine such information as the types and quantities of spray necessary for different classes of weeds; whether it is most desirable to have wet or dry soil for spraying; any after-effects following spraying; most suitable weather conditions and time of the year to spray for weed control.

It is reported that Britain's fleet of crop spraying aircraft—the largest in Europe—is continually increasing the acreage of farm lands being treated. The acreage sprayed by aircraft is estimated to have increased from 35,000 in 1956 to 150,000 in 1958.

In New Zealand, 4,159,444 acres of farm land was top-dressed from the air during the 1957-58 year. The area of seed sown from the air during the same period was 112,757 acres. Aerial spraying of crops and noxious weeds with poisons and insecticides rose by 33% between 1957-58 and 1959-60.

Newest reported use of the airplane in the sugar industry is for cane inspection. The cane inspector at Rocky Point, Australia, conducts an aerial survey of the farms in that mill area. He checks on items such as overburning, cane stocks on trucks and trucks on farms. It is claimed that he makes a fairly thorough survey of the area in about two hours. It would require at least a week or more to carry out the job by automobile. A great advantage is reported to be that he can make regular inspections of outlying farms, which would seldom be seen with road transport.

SOME 1,200 growers and other members of the sugar industry in South Africa attended a two-day mechanization demonstration and show held at the Gledhow-Chaka's Kraal Sugar Co., last fall arranged by the North Coast Regional Field Mechanization Committee.

A number of new makes of tractors were demonstrated. These included the Landini, Volvo, Fiat, Deutz, Track Marshall and Unimog. A side-delivery, Acrobat rake was of considerable interest as a means of handling trash. Several new trailers were displayed, namely the Evans sideloader, the Pick-a-Back and the Upfold straddle loaders. The latter two represent a different loading principle in that the bundle of cane is held beneath the trailer frame rather than on top.

The single-furrow Naardi plough, which is capable of turning up soil to a depth of 30 inches, attracted considerable attention. Cane cultivators and weeders of the Australian Cotton-King type were demonstrated. The International Harvester Drott excavator was shown along with the R. Scott and Co. earth scoop and Shawnee front-end loader with a Fordson tractor.

A demonstration was given of aerial spraying and fire-fighting.

### What's New?

A new-type fertilizer distributor has been developed by Bonel Brothers, in Bundaberg, Queensland, Australia. It is known as a gear selector fertilizer distributor. The unit consists of a frame with large capacity hopper and a worm-feed which allows discharge of fertilizer from two sides in varying quantities. It has a triple row main gear—and two side gears—providing seven different discharge speeds. Bonel Bros. advises that the gear selector is available as a three point linkage unit, or as an attachment for existing toolbar, cultivator or chisel plow. It can also be fitted to the Bonel H.C. disc harrow.

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International Harvester Co. has announced three new tractors in varying sizes and horsepower ranges. They are: the compact 37 h. p. International TD-5 crawler; the big 95 brake horsepower 660 series diesel and the Hi-Clear Farmall 140 series.

---

A new specialized tire, providing high flotation, is being manufactured by Goodyear Tire and Rubber Co. Known as Terra-Tires, the chubby pneumatics are nearly as wide as they are high. They virtually "float" trailers and other mechanical equipment over the group, says the manufacturer. Terra-Tires have been used to carry the Mace missile over all types of terrain. They have been used to haul bananas, clean beaches, harvest crops and scrape race tracts. It appears that this tire may have application for infield transport in the sugar industry.

---

The British have developed a series of Hovertrucks which are robust commercial vehicles designed to operate over land, water or cross-country. First of the series will carry a five-ton payload. The trucks are said to be no more difficult to maintain than an ordinary vehicle and almost as easy to drive.

---

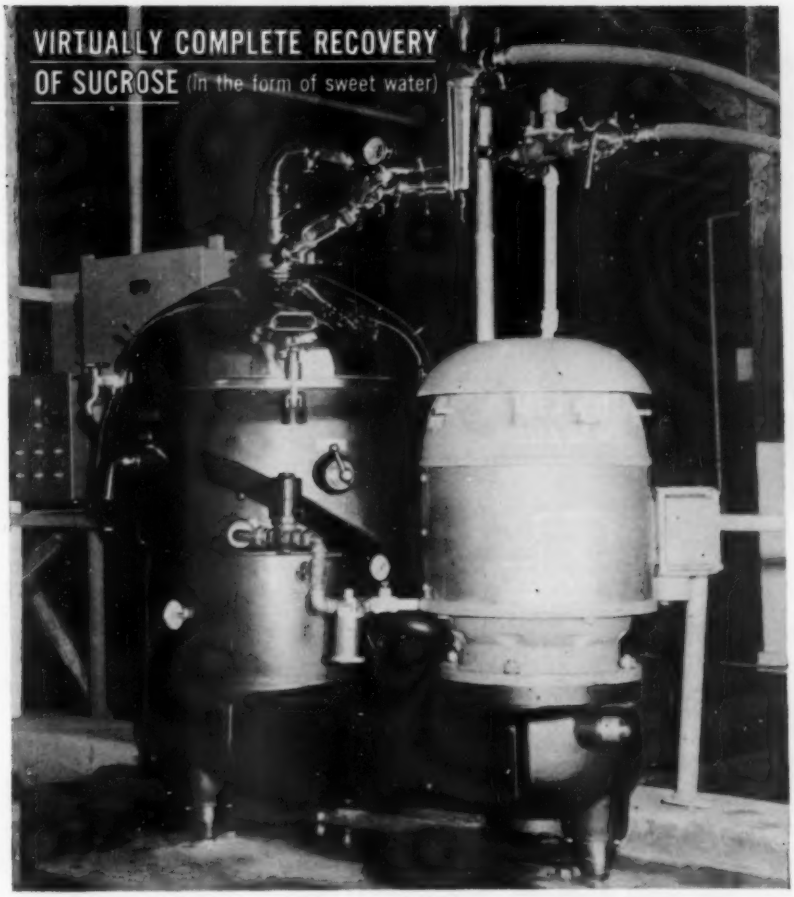
Tractors manufactured in West Germany by Kramer-Werke, with four models ranging from 14 h.p. to 36 h.p., are now being distributed by Kramer American Corp. of Los Angeles, California. The firm has recently been appointed West coast distributors and will provide sales and service for 17 states.

---

A new backhoe, model 250-OX, featuring high flotation, maneuverability and travel speed, has been announced by Hydraulic Machinery Co., in Waukesha, Wis. The unit has four-wheel drive, power-steer, 14.00 x 20-inch tires and heavy duty chasis on 112 inch wheelbase. It is all-hydraulic with three independent circuits. The bucket is ⅜-yard. It has a full bucket dump clearance of 11½ feet.

---

A new dual purpose 40 h.p. high clearance, tractor has been announced by Fiat This model has been introduced to meet the specialized requirements for crops such as sugar cane. Apart from the new high clearance, the unit is identical to the advanced Fiat 411R model announced last year.

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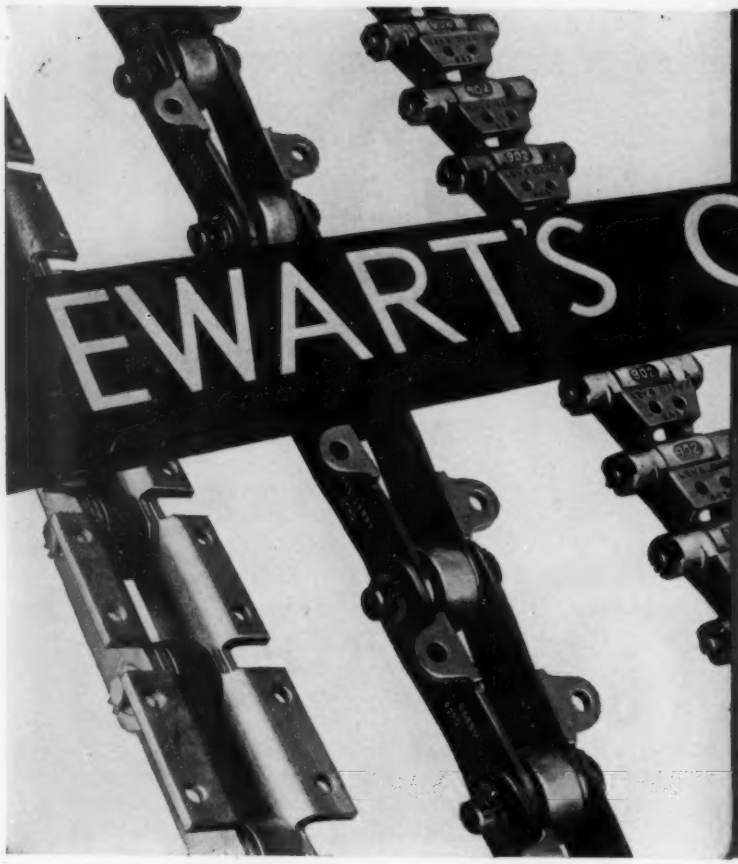

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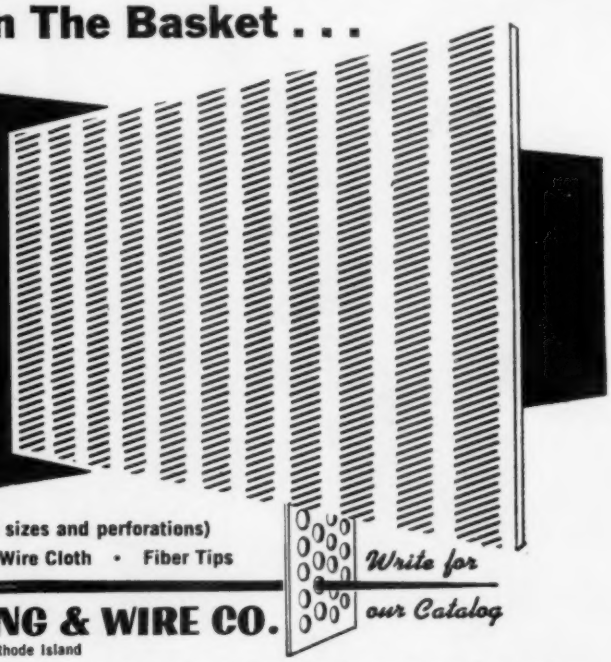

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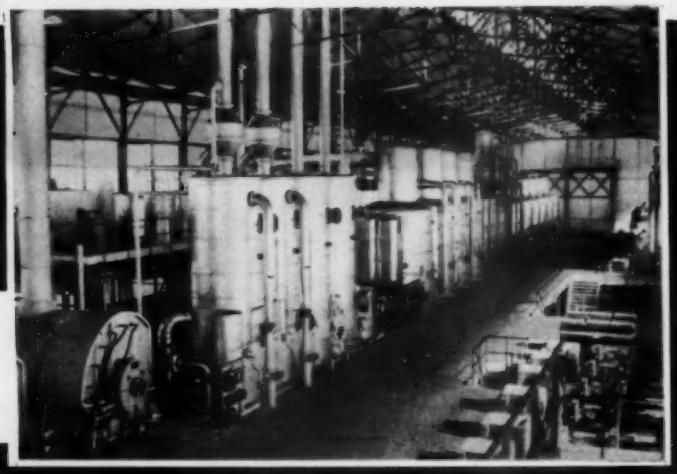

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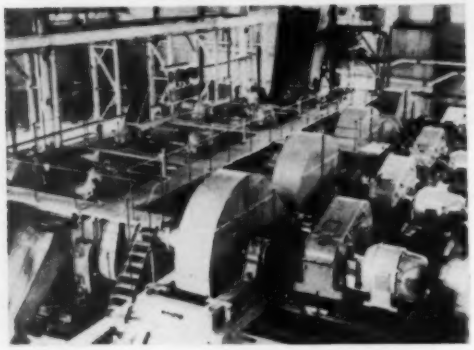

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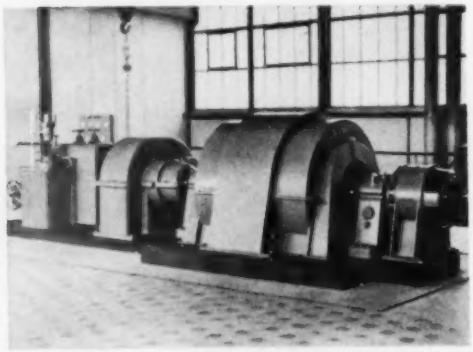

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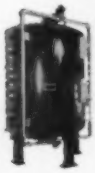

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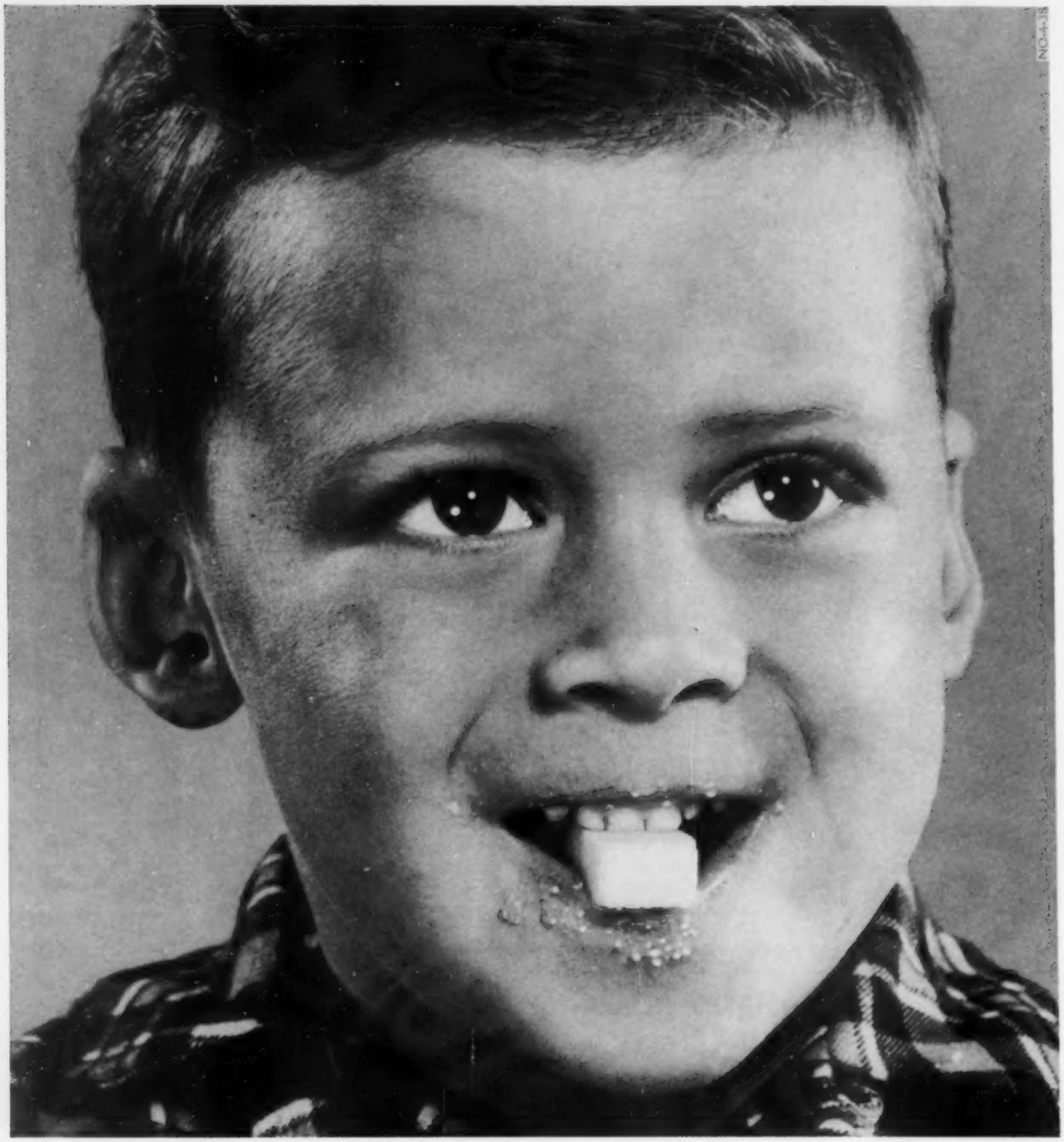


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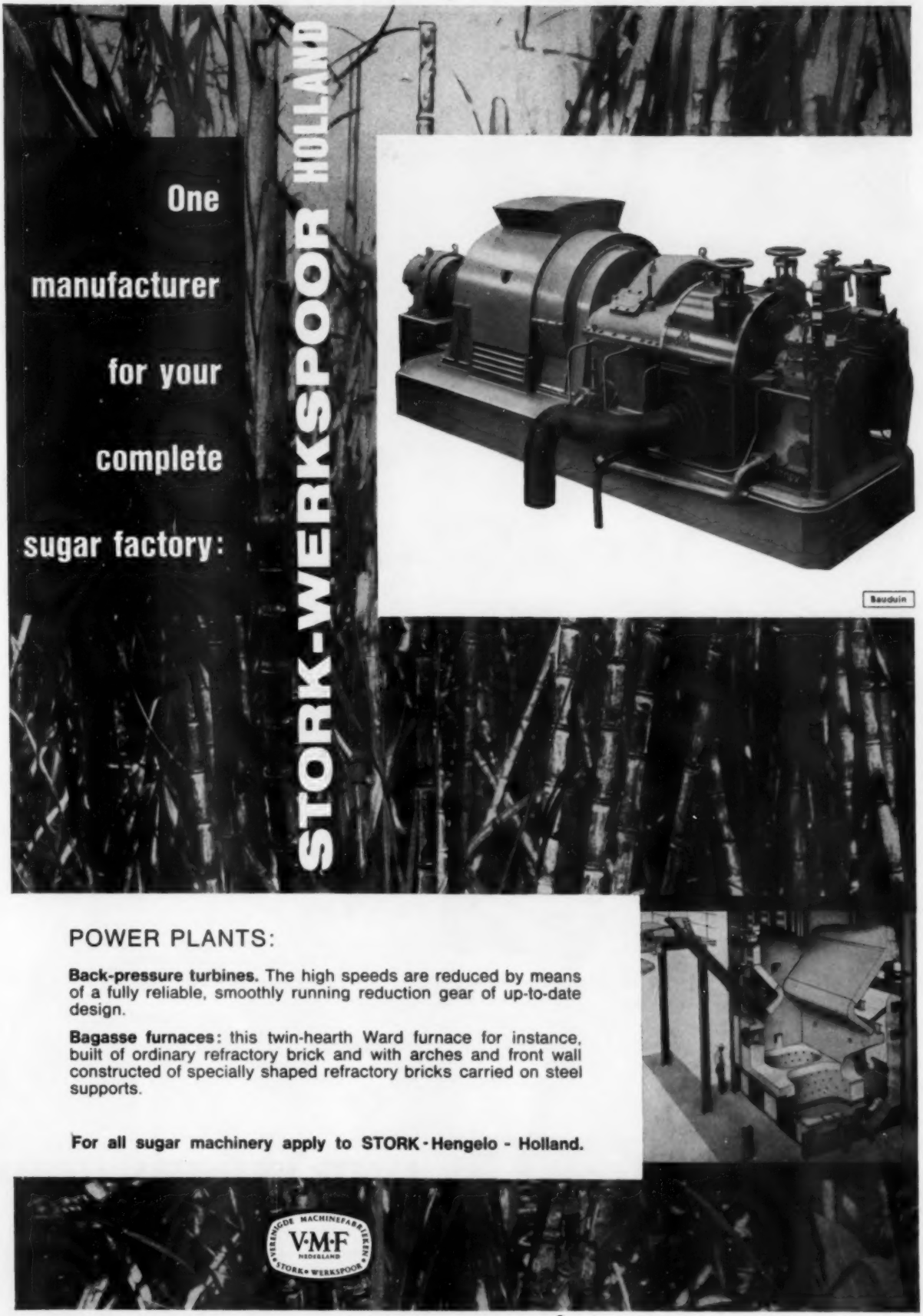
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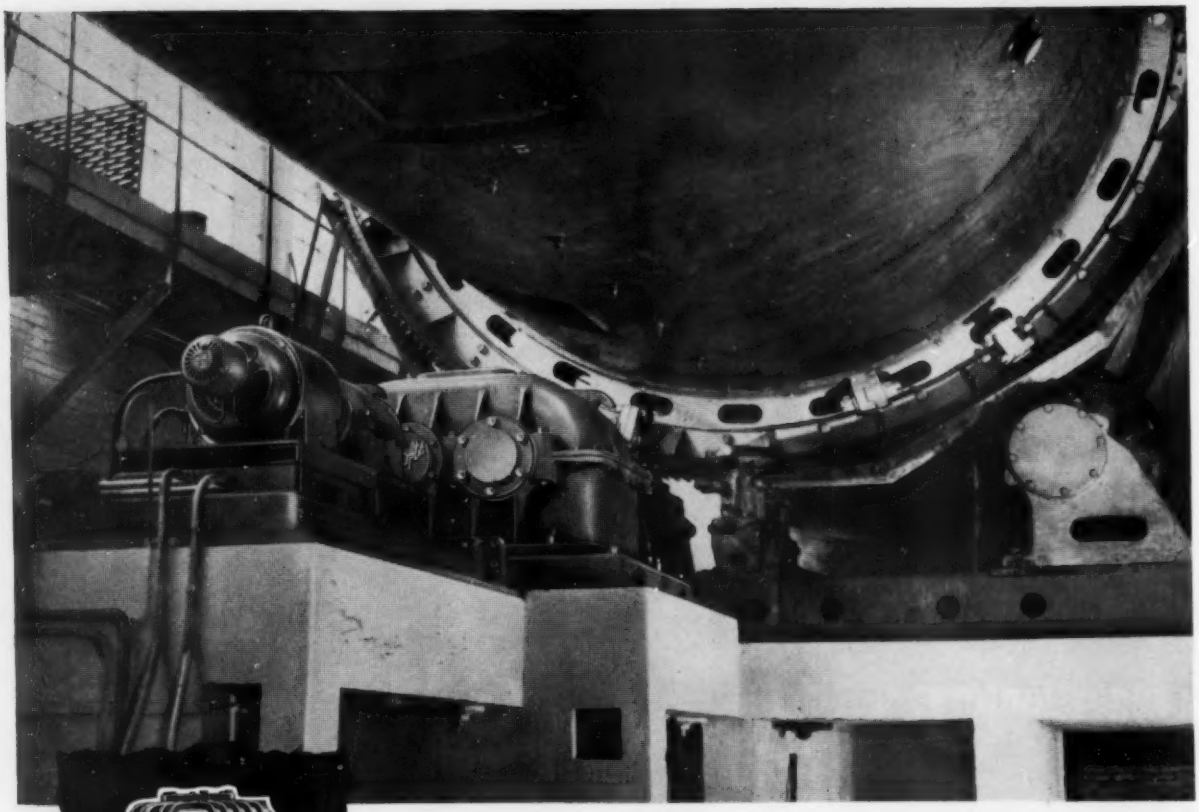
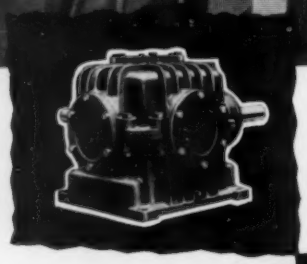
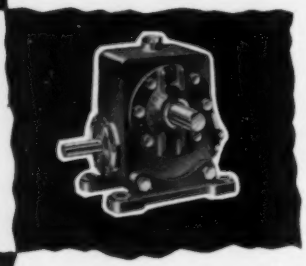




SPIRAL BEVEL GEARS
Publication 549/X

# it's not just a matter of a pinion...



UNIVERSAL MOUNTING WORM GEARS Publication 571/X

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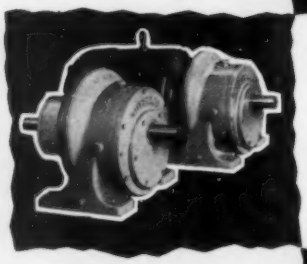
*(If helical gears interest you, you'll probably want to know, also, about the other CROFTS gears shown on this page.)*



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The new unit, 44% larger than the old, permits operation in the face of emergency weather. It will pay for itself within 10 years, and will last indefinitely.

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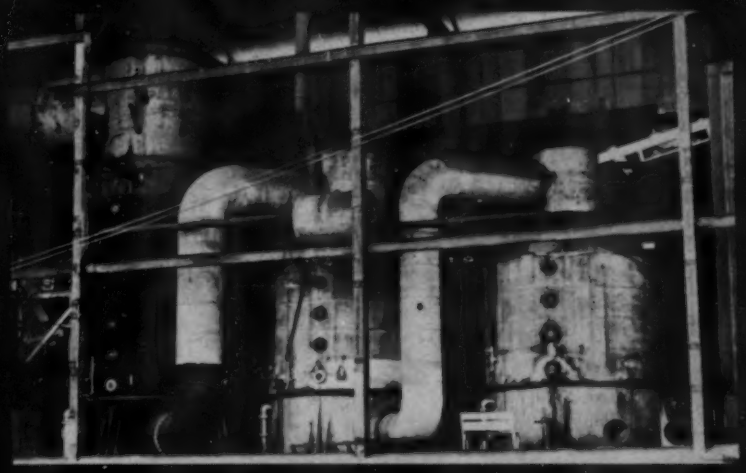
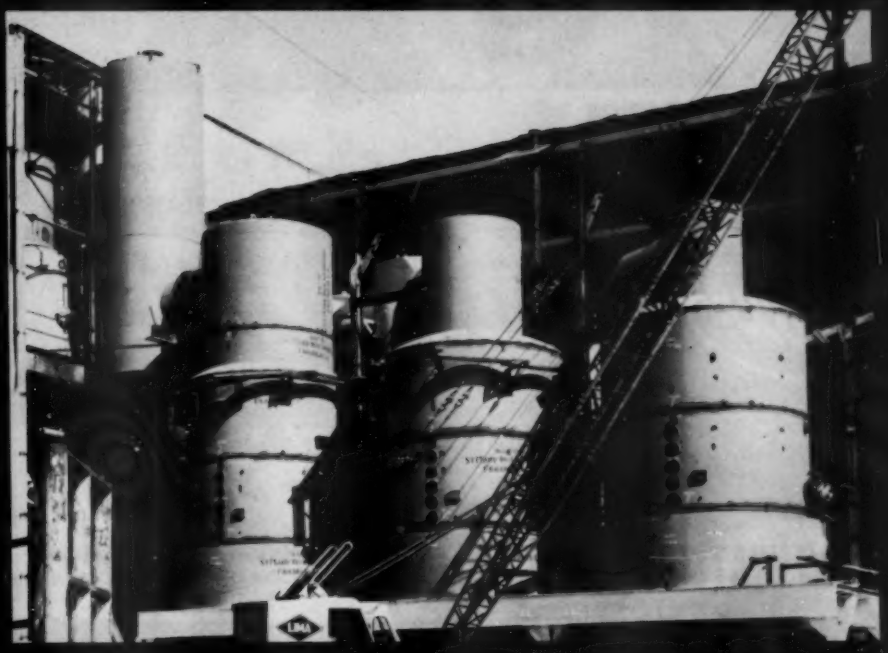


**The 1946 unit fabricated by St. Mary Iron Works is a 12′-diameter triple-effect evaporator with a heating surface of 25,000 sq. ft. It has been "retired" and is used only on a standby basis, every 10 days when the new unit is being cleaned.**



**The new triple-effect evaporator is 14′ in diameter and has a heating surface of 36,500 sq. ft. The unit was designed and furnished erected, complete with building and staging.**

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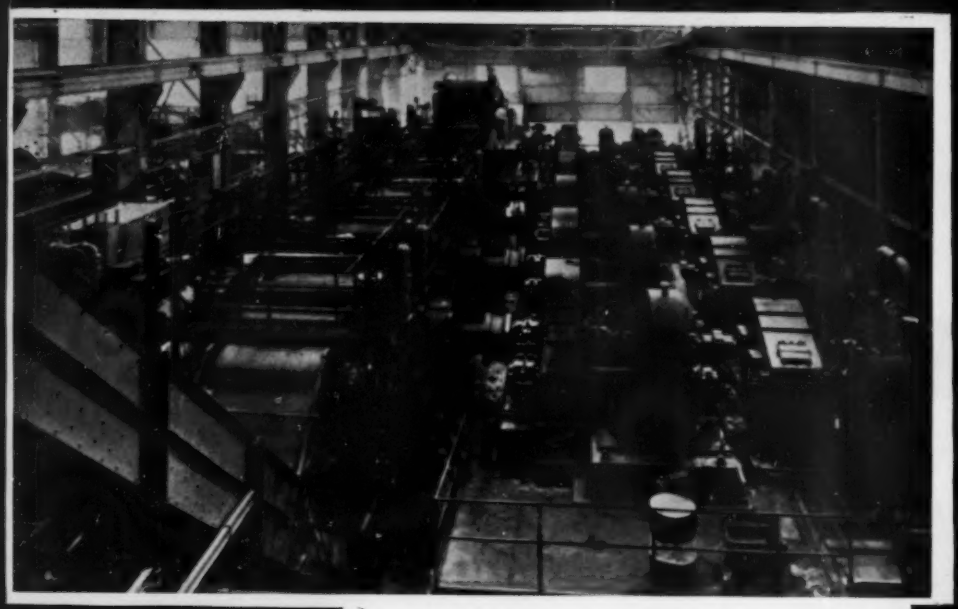

Mirrlees'

Illustration shows an 18 Roll Turbine-Driven Tandem Supplied to the Rio Haina Sugar Company in the Dominican Republic for a nominal capacity of 5,000 TONS/CANE/DAY.

The Tandem is now grinding at the rate of 6,867 TONS/CANE/DAY and the photograph which was taken with the mills in operation strikingly illustrates the reduced number of operators required to run a modern Milling Tandem.

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Cane carrier slats used with this type of chain are made available from Jeffrey in 10-gauge, 3/16" and 1/4" steel. They are available in four styles, hot formed to insure accurate and close fitting beads. Furnished in lengths of 24" to 106" in 6" increments.

Jeffrey Catalog 934 describes all types of sugar mill chain and carrier slats, as well as other sugar mill equipment – from delivery of the cane to shipment of the finished product. For a copy, write The Jeffrey Manufacturing Company, 916 North Fourth Street, Columbus 16, Ohio.

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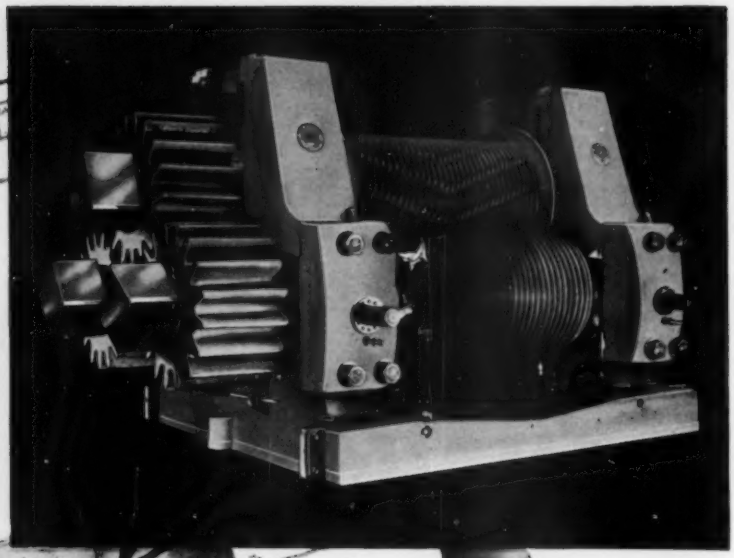

42" x 84" Mill Tandem under construction in our works

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P5086/AP

SUGAR

MARCH, 1961

# Excerpts from the Report of the Special Study Group

by Alexander C. Muir,
Manager, Research & Statistics Dept.,
B. W. Dyer & Company

THE report of the Special Study Group on Sugar, of which Nathan Koffsky was chairman, was released about February 1st. The study was made at the request of the House Committee on Agriculture in connection with ". . . writing a new sugar law, or at least major amendments to the law now on the books . . . ."

Some excerpts follow: . . . "Looking ahead over the next decade, the U. S. need not fear that the break in the traditional flow of Cuban sugar to the U. S. will bring a shortage of sugar. . . . at present U. S. prices to foreign suppliers, almost nine million tons would be available to the U. S. by 1970 . . . this total compares with our total imports of 4.5 million tons in 1959.

. . . "The domestic sugar industry also has a substantial capacity to expand at present prices for sugar crops and present price relationships with competing crops. . . . domestic sugar growers have the capacity to produce over 8 million tons by 1970 compared with . . . the estimated 5.7 million tons in 1961. . . . the potential capacity to produce domestically some 2½ million tons more sugar by 1970 compared with 1961 involves an increase of some two million tons from sugar beet areas, some 300,000 tons from mainland cane areas, and 200,000 tons from off-shore areas.

. . . "It seems clear from a supply viewpoint the U. S. economy could reasonably expect to fulfill its sugar requirements at significantly lower prices in the decade ahead than the prices that have prevailed . . . sugar requirements might total 10.3 million tons in 1965 and 11.3 million in 1970, compared with 9.5 million in 1960. The level of requirements for 1970 is some 5½ million tons less than total projected availabilities under condition of no restrictions and present price levels.

. . . "Our quota system has been designed to provide about 55% of our gradually increasing market to domestic producers and 45% to a select group of foreign suppliers, about two-thirds to Cuba before mid-1960. The foreign supplier has benefited from substantially higher prices . . . with a quota premium in recent years of over two cents a pound compared with the 'world free market.' The latter is not fully representative of world prices in view of the fact that about 60% of the world trade in sugar moves under special arrangement. . . . The domestic grower benefits from the higher prices resulting from the 'quota premium' and the tariff. Additionally, the U. S. grower receives a direct payment averaging 0.7 cents per pound . . . financed by an excise tax of 0.5 cent per pound . . .

. . . "Thus, in a large sense, the goals of our sugar legislation have been realized. The domestic industry has been maintained, and, for mainland growers, has shown vigorous growth in recent years. Foreign countries . . . have received more from sales in the U. S. . . . thus supporting our exports to them. In the case of the consumer, the system has provided a safe and adequate supply, perhaps a margin of safety beyond that actually required. Whether the price paid by consumers was higher than necessary . . . is a matter of judgment. The retail price of sugar since 1947-49 has been free of sharp movements. It has risen somewhat more than retail prices of foods generally, mostly because prices to growers of sugar crops have been better maintained than prices of most other farm products. There have been times in the past during periods of international stress . . . when the 'world free market' price of raw sugar has risen substantially above the price in the United States . . . During these periods, foreign suppliers continued to meet their quotas in order to protect their long-term interests in our market. Additionally, the margin between domestic raw sugar prices and refined prices at retail is almost half of the total retail price and as for most foods the margin has increased persistently over the years, even though less for sugar than for foods generally. Thus, we find in the recent period that while raw sugar prices have returned toward the levels of a year ago, the price of refined sugar at retail has not.

. . . "only one-third of our sugar is consumed directly in the household and the proportion is decreasing. More than half is consumed in the form of processed food products . . . In these, the value of sugar is a small percentage of the total value of the product, mostly within five to ten percent. There is considerable question as to how much of any reduction in the price of sugar that might be accomplished would pass on to the consumer.

"In considering a substantial move toward increasing domestic production as against greater reliance on foreign suppliers, the increase in employment and economic activity generated by a sharp rise in domestic production would be balanced more or less by reductions in our export industries. From this overall view, there appears to be justification for avoiding a rapid and substantial move in one direction as compared with the other.

. . . "there are unused resources in agriculture and a desire to improve farm income generally. . . . a substantial move toward larger domestic production would mean increased investment and employment in beet sugar factories although some cane refining capacity would become surplus.

"It is questionable, however, whether increasing domestic production will provide more jobs than a commensurate increase in imports from foreign countries. . . . The United States is interested in helping these (generally underdeveloped) countries and in promoting increased trade with them. Cuba, in earlier years, supplied two-thirds of our foreign supplies and was accordingly a substantial market for U. S. products.

. . . "A substantial increase in foreign takings over recent levels would mean a considerable liquidation of the domestic industry, including more idle resources on the farm and in the rest of the sugar industry . . .

. . . "The U. S. must decide whether it should reserve a place for the return of Cuba to participation in our sugar market. This has a direct bearing on the kind of sugar programs that might be pursued.

. . . "Looking to the future . . . we start from a highly controlled system which has molded the sugar economy . . . for over a quarter century. An abrupt move to a policy of complete free trade would be disruptive.

"Since 1934, we have built up a vigorous domestic sugar industry. This has involved price protection and other incentives not only for sugar crop growers but for other elements of the industry, as for example, the refiners who benefit from the strict limitation on the quantity of the sugar that may be imported in a refined state for direct consumption.

"Under conditions of free trade, where the forces of the market place govern, much of our domestic sugar industry would not survive. Under the abundant world supply situation which is expected to prevail in the 1960's, there would be an abrupt adjustment to a lower price level from foreign competition. Thus, prices to consumers might well average significantly lower . . . but substantial instabilities in prices and supplies might be introduced.

. . . "The alternatives open to the U. S. involve three basic approaches—quotas, tariffs, or direct payments to producers . . . There are some advantages in spreading adjustments through the combined approach. Thus, our present sugar program, in aiming toward the basic goals of the Sugar Act, relies primarily on quotas but incorporates as well a tariff, an excise tax, and payments to producers.

. . . "A quota system represents the highest degree of control among the alternative approaches. Our present quota system imposes detailed regulation upon the marketing of domestic and foreign sugar and . . . the attainment of certain price objectives. This broad approach has the capability of insuring a steady flow of supplies and a high degree of price stability which effectively isolates the U. S. sugar market from the world market. But the price level is comparatively high on the domestic and foreign sugar . . . marketed in the U. S. And both domestic producers and foreign suppliers would like to sell much more sugar at the prices which prevail in the U. S. market.

. . . "A global quota is a possible alternative to our present foreign quota allocation system. . . . this would be filled on a 'first come' basis. The quota premium would be absorbed by the government. Thus, the foreign exporters would receive the 'World Free Market' price. This alternative would have the advantages of: being more nearly in line with U. S. foreign trade policy; not being dependent on any specific countries for our supplies; permitting new foreign production areas to develop. It would have a disadvantage of the possibility of a few countries eventually emerging as dominant suppliers, leaving the U. S. vulnerable to another 'Cuban' type development.

. . . "The traditional tariff system would represent a substantial loosening of controls . . . There would be no restrictions on where the domestic sugar is produced or where the foreign supply originates. Imports of raw sugar would be at the 'world free market' price and the U. S. price would move with it but at a higher level, depending on the size of the tariff.

"A high tariff would be required to provide the degree of price protection which the domestic producer has realized in recent years . . . if the tariff is the only instrument of protection, the present full duty rate of 62½ cents per hundred pounds would need to be raised to about $3.50. . .|.

. . . "It should be noted that to continue the 1959 level of protection . . . without production restrictions, would bring a very substantial increase in domestic production . . . gross receipts of domestic producers would be sharply improved . . . , although the increase in domestic supplies could well strengthen the price bargaining position of processors relative to growers. The consumer would gain no advantage.

. . . "There are possible modifications . . . to yield attributes of the quota approach. The *variable* tariff . . . could be used to control imports into the U. S. and thus the supply and price in the U. S. by raising or lowering the tariff rate . . .This might make for some irregularity of foreign supplies available to the U. S. A *tariff quota* system would establish a tariff for a specified amount of sugar . . . excess would be subject to much higher rates. Under this situation, there might well be a race among foreign suppliers to fill the quota with an erratic movement of supplies to this country. . . .

**Direct payments to producers** . . . "involves a loosening of controls, basically provides for a lower level of prices approximating the 'world free market' but . . . makes a direct payment to the domestic producer to bring returns per unit up to a specified level. Thus, prices to consumers would be generally lower . . . but quite variable.

"If the 1959 return per unit to domestic growers were to be maintained while at the same time prices were to move toward the 'world' level. a direct payment of about 3½¢ on each pound produced in the U. S. would be required in the absence of other protective devices. . . . the present payment averaging 0.7¢ per pound. . . . the current level of returns to domestic producers, if maintained over time, would bring a substantial expansion in production unless restrictions were imposed.

"These payments—which would be very substantial—could be financed by direct appropriation from the Treasury or from an excise tax . . . the incidence of the excise tax would bear more or less equally on all people. While an excise tax on all sugar . . . of about 2¢ per pound could be used to finance direct payments for the present domestic share, about 2½¢ might be required by the end of the decade. . . The advantage to users of lower prices for sugar would narrow to about ¾ of a cent per pound by 1970. The effect on domestic producers —as under the tariff with similar incentives —would be favorable, involving a substantial gain in production, while the reverse again would be the case for foreign suppliers. . .

. . . "For the direct payment approach . . . the amount of payment could be adjusted to provide in rough measure any distribution as between domestic production and foreign suppliers . . . Again, to hold approximately the present statutory distribution, without production restrictions, would mean a lower rate of payment to domestic producers—perhaps 2¾ to 3 cents a pound. The excise tax . . . would be somewhat lower and a small further reduction in prices to users would occur.

"Each of the approaches considered so far has some shortcomings which can be mitigated at least in part by combinations . . . Only two illustrations are presented in detail . . . one involving a combination of two approaches and the other a combination of all three. The present sugar program is one illustration of a combination of all the approaches, but with primary reliance on the quota system.

. . . "Finally, we realize that the Congress will need to consider alternatives for a sugar policy in relation to other national objectives, such as foreign policies and our policies for agriculture.

"For many years, the U. S. has directed its efforts towards reducing trade barriers and encouraging an expansion in world trade under GATT. . . . there may be other elements involved in our national foreign policy, political as well as economic, which could influence the development of a sugar policy in the full national interest.

"Further, there are now substantial pressures to expand domestic sugar production sharply and widen opportunities for our farmers. We have noted that while average crop prices have moved to a level some 15% lower than in 1953, per unit returns for sugar crops have been maintained. We should keep firmly in mind that developments in agriculture generally in the period ahead will have an important bearing on the competitive position of sugar crops relative to other farm opportunities."

■

## Plant Resistance to Disease

Scientists of the United States Department of Agriculture have found that the presence or absence in a plant of a protein identical to one in a disease organism may account for the susceptibility or resistance of a plant to the disease organism. Study by the scientists showed this was the case in plants susceptible or resistant to different genera of the rust fungus *Melampsora lini*. Plants susceptible to a particular genus contained a protein found in that genus, while resistant plants did not. The discovery provides the evidence of the nature of physiological resistance in plants and points the way to new breeding methods to eliminate diseases.

*Higher Operating Efficiency*

# Improved Two Boiling System

By

**Gerardo Fundora Jr.,**
**Centrals Cuba & Santo Domingo**

**Mario A. Mascaró,**
**Technical Editor, Sugar y Azucar**

**The following article describes an improved two-boiling system developed by the authors which is now in successful operation in several important mills in Cuba and in other countries. Data are included to show the marked advantages available through the use of this system in raw sugar manufacture. The paper was presented at the Tenth Congress of the International Society of Sugar Cane Technologists and is reproduced with permission. The discussion following the presentation of the paper is included in the article.—Editor**

It appears almost impossible to originate an entirely new boiling scheme; but it is possible to offer original improvements capable of yielding substantial advantages to any of the two, three or four classical boiling schemes.

The Improved Process for a Two-Boiling System, as proposed by the authors, offers all the advantages of the Three-Boiling System but improves it with various novel features:

1. Lower percentage of solids in strikes per unit solids in syrup; 2. a single type of raw sugar manufactured: all first sugar, in comparison with two types of raw sugar produced in the Three-Boiling System, which contains more color, has lower polarization and poorer refining, keeping and handling qualities, particularly for bulk shipment; 3. elimination of second strikes; 4. low sugar, for seed-magma, does not require washing and repurging; 5. increase of capacity and efficiency of pan and centrifugal stations; and 6. steam savings.

The Improved Process for a Two-Boiling System operates with two massecuites: one with 83 to 85 purity yielding commercial raw sugar of 97.5 to 98.0 polarization without washing at the centrifugals; and the other with 59 to 60 purity, yielding sugar for seed-magma and final molasses. Our experience in Cuba indicates that low-grade massecuites above 60 purity do not yield properly exhausted final molasses.

The first massecuite is quick-cooled until it reaches 130 to 135° F in crystallizers equipped with heat exchangers capable of reducing massecuite temperature at the rate of 9° F per hour, having one square foot of cooling area for every cubic foot of holding capacity, one revolution every 2½ minutes, and circulating 25 gal. of water per minute at 78° F. This treatment results in increasing the size and improving the shape of sugar crystals and yields molasses of lower purity than the purity of the second and final massecuite. Re-heating to saturation temperature is applied in the mixer before purging.

Molasses from first massecuite, without quick-cooling treatment, is concentrated to supersaturation between 1.25 and 1.50, depending on purity, operating under instrument control and seeded with finely powdered pure sugar (pan seed or fondant), according to the Gillett method, in the proportion of 2.0 to 2.5 lbs. for every 1,000 cu. ft. of final massecuite to be produced. The powder should be well mixed with isopropyl alcohol, preferably with a mechanical stirrer. The liquor or molasses from the árst massecuite is fed until the pan is full and the massecuite discharged into the crystallizer as usual.

Molasses full seeding is made once every 36 to 48 hours, in accordance with available capacity of crystallizers, for grain storage. Seed-magma sugar crystals have a size of 0.4 mm which are developed to 0.84 mm in the commercial sugar.

This technique has been under practice for 3 full crops in one Cuban sugar mill (Central Santo Domingo), for 2 complete crops in another (Central Cuba), one crop at Central Fajardo, and for one crop at Central Porfuerza where 100% of its raws are refined. The essential points in the method are the following:

a. adequate purities of massecuites; b. partial quick-cooling of first massecuites to fixed temperatures; c. first crystallizers equipped with heat exchangers of improved specifications and operation in order to obtain proper results, and d. re-heating of first massecuites to a fixed temperature before purging.

Detailed figures made on balance of solids, water evaporation and steam consumption for the various boiling systems of Spencer, Saladin, Webre and the Improved Process of Two-Boiling Scheme, are omitted in the interest of brevity, but these technical data are available to interested persons.

The accompanying tables show some of the important data.

**TABLE I**
**Comparison Different Boiling Systems**

| System | Lbs. water evaporated by pans per h. | Lbs. steam consumed by pans per h. | B H P equivalent | Gallons water to condensers per min. | Gallons water molas. dilution every 24 h. | Cubic feet massec. produced every 24 h. |
|---|---|---|---|---|---|---|
| **Spencer** | | | | | | |
| **Three massecuites** | | | | | | |
| **Syrup cristalliz.** | 44,225 | 51,718 | 1,475 | 4,516 | 4,752 | 21,888 |
| **Saladin** | | | | | | |
| **Four massecuites** | | | | | | |
| **Syrup cristalliz.** | 42,975 | 50,271 | 1,434 | 4,389 | 4,488 | 21,384 |
| **Webre** | | | | | | |
| **Three massecuites** | | | | | | |
| **Molasses full-seeding** | 38,975 | 45,681 | 1,303 | 3,980 | 3,600 | 19,800 |
| **Improved process** | | | | | | |
| **Two massecuites** | | | | | | |
| **Molasses full-seeding and controlled cooling of first massecuite** | 33,975 | 39,931 | 1,139 | 3,470 | 2,424 | 17,544 |

### TABLE II

**Two Years Experience With The Improved Process At Central Santo Domingo**

**Analysis of Raw Sugar Manufactured**

| | | | |
|---|---|---|---|
| Polarization at 20° C | 97.85 | Non-sugar organic matter | .37 |
| Safety factor | .26 | | |
| Dilution indicator | 35.22 | **Grain Size** | **Percent** |
| Glucose/ash ratio | 1.55 | Over screen No. 10 | .10 |
| Solid impurities | 1.59 | Over screen No. 20 | 73.71 |
| Insolubles | .04 | Over screen No. 30 | 28.83 |
| Filtrability (Elliott rev.) | 115.00 | Over screen No. 40 | 1.86 |
| Clerget (J & G IV) | 98.05 | Through No. 40 | .50 |
| Moisture | .56 | Average size: 0.77 millimeters | |
| Reducing Sugars (M & W) | .62 | or between Nos. 4 & 5 | |
| Ash | .40 | | |

| Affination Washing Influence | Without washing | Washed | Removed |
|---|---|---|---|
| Polarization at 20° C | 97.85 | 99.20 | —— |
| Reducing sugars | .62 | .09 | 85.48% |
| Ash | .40 | .14 | 65.00 |
| Dye value | 280 | 55 | 80.35 |
| Color (Stammer) | 58.0 | 4.8 | 91.72 |
| pH | 6.6 | —— | —— |
| Washing test (HORNE) | 98.00 | —— | —— |
| Foam test (PAYNE) | 90-130 | —— | —— |

### TABLE III

**One Years' Experience With The Improved Process At Central Cuba**

**Analysis of Raw Sugar Manufactured**

| | | | |
|---|---|---|---|
| Polarization at 20° C | 97.70 | Non-sugar organic matter | .35 |
| Safety factor | .2 | | |
| Dilution indicator | 31.43 | **Grain size** | **Percent** |
| Glucose/ash ratio | 2.02 | Over screen No. 10 | — |
| Solid impurities | 1.75 | Over screen No. 20 | 80.10 |
| Insolubles | .05 | Over screen No. 30 | 17.50 |
| Filtrability (Elliott Rev.) | 112.50 | Over screen No. 40 | 2.10 |
| Clerget (J & G IV) | 97.92 | Through No. 40 | .30 |
| Moisture | .55 | Average size: 0.79 millimeters | |
| Reducing sugars (M & W) | .79 | or No. 5. | |
| Ash | .39 | | |

| Affination Washing Influence | Without washing | Washed | Removed |
|---|---|---|---|
| Polarization at 20° C | 97.70 | 99.20 | —— |
| Reducing sugars | .79 | .12 | 84.81% |
| Ash | .39 | .11 | 71.79 |
| Dye value | 260 | 70 | 73.08 |
| Color (Stammer) | 38.1 | 4.8 | 87.40 |
| pH | 6.9 | —— | —— |
| Washing Test (HORNE) | 98.00 | —— | —— |
| Foam Test (PAYNE) | 80-120 | —— | —— |

### TABLE IV

**Solids Handled For Different Boiling Systems**

| | @s. of massecuites per h. | @s. of molasses per h. | @s. of raw sugar per h. |
|---|---|---|---|
| Spencer Three massecuites Syrup cristalliz. | 2,638 | 1,338 | 1,300 |
| Saladin Four massecuites Syrup cristalliz. | 2,562 | 1,262 | 1,300 |
| Webre Three massecuites Molasses full-seeding | 2,314 | 1,014 | 1,300 |
| Improved process Two massecuite and controlled cooling of first massecuite | 1,985 | 685 | 1,300 |

1 @ = 25 pounds

## Discussions

*M. A. del VALLE (Puerto Rico):* Is the new system limited to the mills that you mention, or are other mills in Cuba also using your Improved Two-Massecuite method?

*M. A. MASCARÓ (Cuba):* We are using the system also at Central Fajardo, at Central Porfuerza (with refinery), and at Central Río Cauto making special raw sugar, low moisture content, for animal feed.

*Mr. del VALLE:* Don't you use the old two-massecuite system also as we do in Puerto Rico? In Puerto Rico the two-massecuite system is quite common, but it is not improved in the way you have suggested.

*Mr. MASCARÓ:* Cuba performs Three, Four and even Five Massecuites. No sugar mill uses the old two-massecuite system. Our Improved Process of Two-Boiling System is used with complete success in mentioned sugar mills. Acceptance by other mills is slow because present legislation does not allow proper compensation for more recovery through higher efficiency. All improvements for higher efficiency require more investment for equipment and services.

*M. H. TANTAMI (Egypt):* What is the purity of the seed-magma? What is the retention time? Do you cool the second massecuite? What is the purity of the molasses?

*Mr. MASCARÓ:* Purity of seed-magma is around 85-87. Retention time for quick-cooling of first strikes is one hour; sometimes less. We cool second massecuites, which are exhausting massecuites, to 100 deg. Fah.; it depends on circulation water temperature. Reports show 33 apparent purity for final molasses. It depends on original purity of mixed juice.

*M. MOHAN (India):* What is the purity of low grade sugar?

*Mr. MASCARÓ:* It is around 95.

*C. H. McALISTER (Hawaii):* What is the viscosity of your low-grade massecuites?

*Mr. MASCARÓ:* We have no precise laboratory tests. But positively it is less than the viscosity for final massecuites on three and four strikes systems. The reasons are obvious.

*Mr. McALISTER:* Particularly, I was referring to viscosity of short-crop cane versus long-crop cane. You have a one-year crop in Cuba, we have a two-year crop. You have centrifugals that spin out the sugar in 11 minutes, whereas in Hawaii we require 45 minutes.

*Mr. MASCARÓ:* On account of your two-year crop, mechanical harvesting, more quantity of crystals or grain in your final massecuites and lower purity in mixed juice and final strikes, you certainly require a longer time for centrifuging.

(*Continued on page* 43)

*Sugar's Progress in*

# HUMAN RELATIONS

Roy J. Leffingwell

## Let's Face The Facts On Mechanization

We hear that in Jamaica mechanical cane loaders have remained idle during the current harvest season due to resistance from labor. This is only one of many areas in which progress is halted because of the conflict between man and machines.

Mechanization is a major problem. It must be faced by every sugar area—sooner or later. Let's face the facts now and take the necessary action to pave the way for this transition. The problem will not solve itself, or go away. And, workers are not going to be satisfied with pay that hand labor can provide.

All the facts necessary to take action on mechanization planning are available. From experience, first in Hawaii and more recently in other sugar areas, it is possible to figure how many men will lose their jobs when machines are substituted. The cost of machines are available.

To plan for mechanization it is imperative that management first understand what will happen, then prepare workers and public opinion to take some of the bitter with the sweet. It will also take money for the care of displaced laborers.

Security is one of the basic needs of all human beings. When security is threatened, you can expect trouble. Machines threaten the security of people because some of the work force will lose their jobs. Until there is understanding as to who will gain by machines, and who will lose, expect all workers to fight mechanization.

But, machines are actually the friend of the working man. Most human beings want a higher standard of living. They constantly demand more money. The only way any industry can pay more is to get greater productivity. Human beings can only produce more for industry by working more efficiently, or by the use of machines.

Regardless of how hard a man may strain himself, it is difficult to increase his productivity by more than 50 percent. Most people refuse to push themselves over long periods of time—even for this increase in money, but with a machine, man can increase his productivity 200 to 1,000 percent, and more—and not work as hard. As a result he shares in this productivity.

Unfortunately, when one man does the work of several, other men must lose their jobs. With the introduction of machines there is almost invariably a dislocation of labor. However, those remaining on the job earn several times what they received as hand laborers. In Hawaii, earnings have increased by as much as 16 times. This higher earning increases the demand for goods and services. New jobs are created to meet these demands.

Recently, the longshoremen's union on the West Coast of the U. S. accepted a new contract which allowed management almost unlimited authority to use machines. But to get this the companies and the union must share in the profits of mechanization. A fund of $1.5 million a year is setup for 17,000 dock workers. This runs to some $176 per worker over two years.

There is little evidence that sugar management is doing very much about facing the facts of mechanization. Too often, an attempt is made to slyly slip in a machine in the hope that no one will complain. This will seldom work. If it does, it is an uneasy truce.

Enough is known about mechanization today to allow management to do an intelligent job of planning for the use of machines. Profits must be shared with labor and it will require a serious educational effort. But, let's face the facts and do the job right. There is enough profit in machines for all.

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Time and motion studies provide management with one of their basic tools for improving work efficiency. This skill was developed by Frederick Winslow Taylor, a day laborer who became the first efficiency expert.

Taylor was working at Midvale (Penn.) Steel Works in 1880 when he discovered that low production of men frequently resulted from a lack of understanding as to how to work. They usually learned their jobs by rule of thumb. Steps were wasted and there were other lost motions—even when they tried hard to do a good job.

In an effort to teach workers to do a better job he developed a new technique. Every task of a specific job was broken down to its component part. Then with a stop watch, he determined the most efficient method of accomplishing each component.

Later, Taylor was employed by Bethlehem Steel Co. He was asked to make a study of the job of shoveling ore, coal and other material in a storage yard. He found that because workers used different sized shovels their ouput varied widely.

He tried using a shovel holding 34 pounds of ore, then shifted to a shorter shovel, holding 30 pounds. For every reduction in load, each man's daily tonnage rose—until a 21 pound level was reached. Below that, production fell. Finally a 21½ pound shovel was arrived at as the most efficient.

The result was that the yard labor force was reduced by two-thirds and daily loadings rose from 25 tons per man to 45 tons.

Considerable progress has been made in the refinement of techniques since the early time and motion studies by Taylor, however the objective is basically the same. Following are the objectives of time and motion studies today:

1. Economy of labor
2. Simplifying work
3. Laying out work positions
4. Reducing handling
5. Standardization of processing procedures
6. Determining standard processing times
7. Planning of work and production programs
8. Distribution of work between operatives and machines
9. Measuring and regulating productivity
10. Establishing awards for achievement
11. Preliminary costing

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The regional conference of the Madras Regional Productivity Council in India brought forth six conditions which were said to be essential to secure labor cooperation for productivity. According to Indian Sugar magazine, these are:

1. Clear and genuine determination on the part of all concerned to cooperate.
2. The strengthening of the trade union organization.
3. Fair wages and decent working and living conditions.
4. Assurance that gains of higher productivity will be shared by workers, dissemination of all necessary information to workers to help intelligent participation in industry.
5. Consultation with workers on personnel policy.
6. Facilities and opportunities for workers to train and advance their position.

---

Basic wages in the Australian sugar industry have been increased by the Industrial Court. The increase is three shillings per week (about U.S. 30¢). This brings the adult basic wage rate for field workers to 13 pounds, 16 shillings, per week (about U.S. $30.)

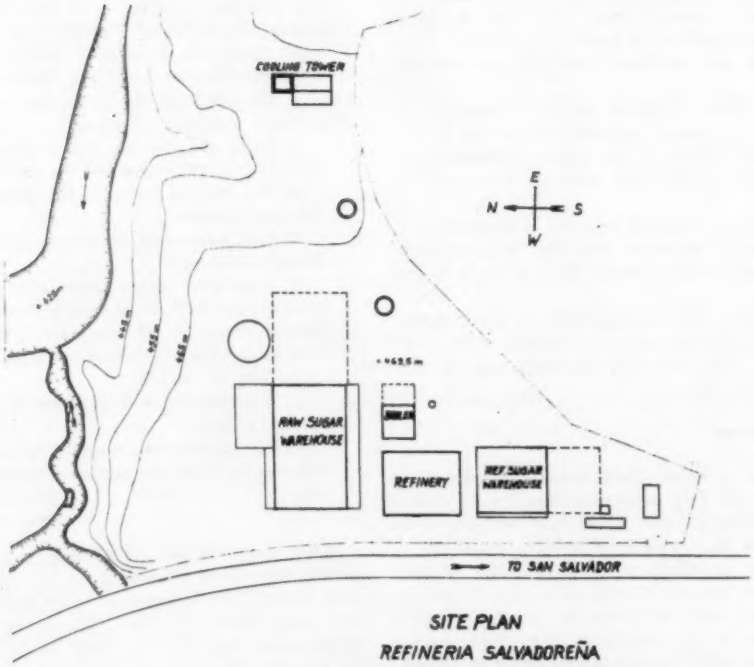
*Fig. 2*

# The First Independent Sugar Refinery in Central America


By
G. O. Winter,

Chief Engineer, Maschinenfabrik Buckau R. Wolf


*Fig. 1*




SITE PLAN
REFINERIA SALVADOREÑA
DE AZUCAR S.A., SAN SALVADOR, C.A.

THE new sugar refinery at San Salvador, the capital city of the Republic of El Salvador, is now in operation. It is owned and operated by Refineria Salvadoreña de Azúcar S.A. as a cooperative project of the raw sugar producers of the region. Its nominal capacity is 150 short tons of refined sugar per day. The contracting builders were Maschinenfabrik Buckau R. Wolf, with technical assistance from the Engineering firm E. A. Rose, Inc., of New Orleans. Incidentally, it is the first sugar refinery to be built in Central America.

Owing to the roughness of the terrain the various structures could not be built in a compact group. Fig. 1 is a sketch of the site. The main sugar house is shown in Fig. 2. The cooling tower for the condenser water is Fig. 3.

The incoming raw sugar is received in a 92 ft. x 158 ft. bunker (Fig. 4) having a capacity for 11,000 tons. From here it is weighed out into another bunker over an electrically controlled, automatically registering "Toledo" scale. The sugar then falls into a mingler where it is mixed with the last runoffs of residual refinery products to form a magma which is distributed to the affination centrifugals, which also receive the A and B sugars destined for affination. The affination centrifugals empty the sugar directly into a solution-vat which is equipped with a high speed special stirrer and automatically apportions to each centrifugal load the necessary amount of solution-water. A continuously recording density-central apparatus controls this station very important for the steam economy.

The centrifugal station (Fig. 5) includes two affination centrifugals and three raffinade centrifugals for each 500 Kg (1,100 lbs.) of load, and three centrifugals for 350 Kg (770 lbs.) of intermediate products. These centrifugals are electrically driven and operate electro-automatically. The filling slides are actuated by pneumatic push buttons. The centrifugals are emptied by hand-operated sugar plows.

Because of the high room temperature due to the tropical climate, all centrifugal motors are connected with the outlets and inlets of a ventilation system. Electrically controlled flaps shut off from the outside air any centrifugal motor that is not being operated.

Two sets of vessels with propeller-stirrers are used for handling the clear syrup according to the "Suchar" process involving the use of phosphoric acid, milk of lime, activated carbon and diatomic filter aids. The materials for these operations are kept in a supply room directly adjacent to the stirring vessels. Below these treatment-vessels is a long row of centrifugal pumps which, like all other electric drives in the refinery, are totally enclosed fan-cooled (Fig. 6.)

For the preliminary purification of the syrup and for taking some of the load off the main filter, there are provided two "Jacobs" clarifiers. These preliminary clari-

*Fig. 5*

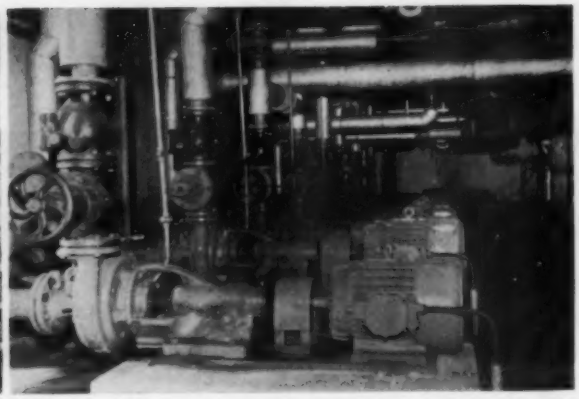


*Fig. 6*

fiers are connected with an "auto-filtering" system in which the remaining impurities such as decolorizing carbon are removed with the help of filter aid.

To the "auto-filter" is attached an "Industrial" safety filter with filter-paper tubes. Between this station and the boiling station there is another continuously registering control for the syrup density.

For boiling the purified syrup there are provided two raffinade pans, each with a capacity for 22 tons of massecuite. Further there is a similar pan for A and B massecuites, and an 11-ton pan for the C product. (Fig. 7). Vacuum is produced by "Koerting" multijet condensers. (Fig. 8). In the two raffinade pans, four products are boiled one after the other, and after purging are dried and cooled in drum dryer, and the four qualities of sugar are segregated in four silos holding 18 to 25 tons. From these silos sugar is withdrawn in certain proportions and blended in a single standard raffinade. After being freed from lumps the standard raffinade goes to the packing room where a completely automatic "Toledo" weighing machine, puts it into 100-lb. bags. This machine is photo-electrically operated so that no other control of the weighing operation is necessary. The bags are closed by a "Union-Special" sewing machine.

To counteract the condensation of air moisture during the rainy season the raffinade storage room is equipped with a climate-control plant.

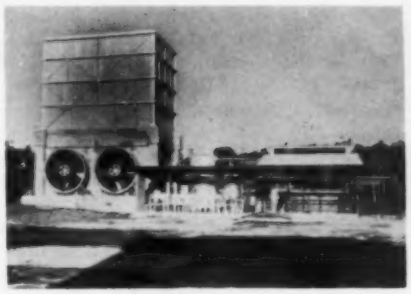


*Fig. 3*

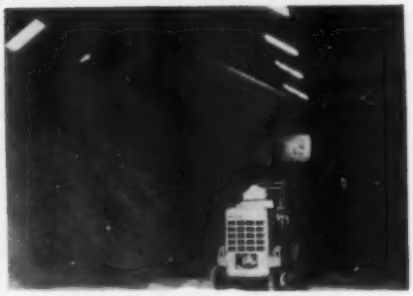


*Fig. 4*

Steam is raised in a completely automatic Buckau-Wolf radiation boiler, using crude oil as fuel, and delivering 22/tons/hr. at 230 psig. and 705° F. Electric power is supplied by a 1,000 kw. turbo-generator with 9-field switching.

After erection of the buildings and installation of the equipment the plant was subjected to a 30-day acceptance test for production, steam consumption, boiler efficiency and sugar yield. The test run showed the following results:

Refined sugar output: 94.3% of the incoming raw sugar which on the average contained 97.24 pol, 0.75% invert and 0.53% ash.

Standard raffinade: pol 99.95%, purity 99.98%, moisture 0.03%, color 0.46 Lovibond.

Steam consumption: 174 lbs per 100 lbs, raw sugar.

Boiler efficiency: 86.8%.

Power Consumption: 600 kw for a daily production of about 155 tons.

Fresh water requirement: about 30 gal. per 100 lbs. raffinade.

In judging these values it should be remembered that they were obtained in a trial run and may be expected to improve as the personnel gains experience.

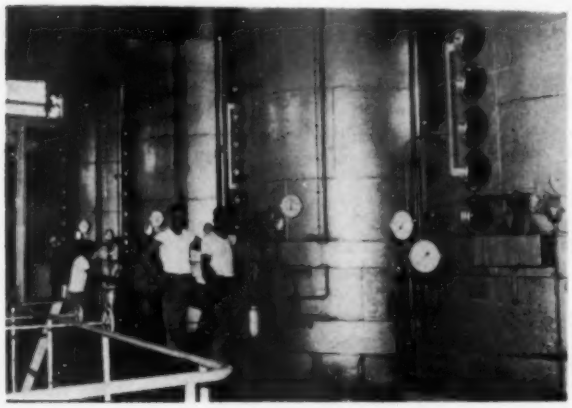


*Fig. 7*

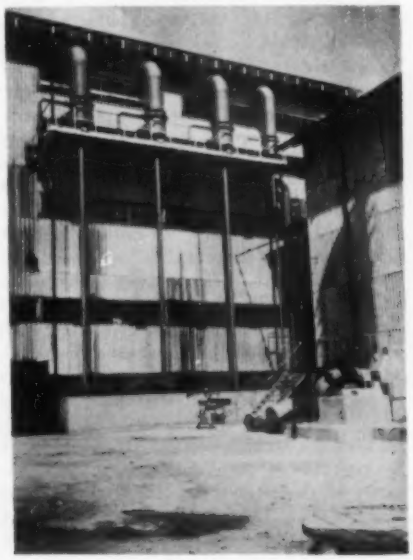


*Fig. 8*

# facts about sugar

NEW YORK, FEBRUARY 10, 1961: Chairman Cooley (D., N.C.) of the House Agriculture Committee presented a bill on February 2nd calling for a 21-month extension of present sugar legislation beyond its March 31st dead line. B. W. Dyer & Company, Sugar Economists & Brokers, report that the bill did not ban Dominican sugar, but some predict President Kennedy will request this.

At the Sugar Club luncheon on January 19th, Lawrence Myers, Director, Sugar Division, U.S. Department of Agriculture, pointed out that great danger is involved in delaying too long the extension of the Sugar Act, as it requires from several days to several weeks for sugar to reach our ports. (SUGAR, Feb. 1961, pg. 29.)

From a supply viewpoint, U.S. sugar requirements can reasonably be expected to be fulfilled at significantly lower prices in the decade ahead, according to the Special Study, chaired by Nathan Koffsky, which was released about February 1st. This study, conducted at the request of the House Agriculture Committee, (see page 31 of this issue) also states that the present system, which relies primarily on quotas, but also incorporates tariff, excise tax and payments to producers, has, for the most part, achieved the goals of the U.S. sugar program. Tariffs, incentive payments, excise taxes and quotas alone were said to have disadvantages which can be compensated for by a combination of all. Also, that an abrupt move to a policy of free trade, would disrupt the U.S. sugar market and industry. Based on present population growth, U.S. consumption was placed at 10.3 million tons in 1965 and 11.3 million in 1970, compared with 9.5 million in 1960. Domestic sugar growers, at current prices and without production controls, were estimated to have the capacity to produce over eight million tons by 1970, compared with production of 4.9 million tons in 1959. Available supplies of foreign sugar, at current price levels, are expected to total almost nine million tons in 1970. At current prices, the following is expected to be available to the U.S. in 1970 (in thousands of short tons, raw value): Union of South Africa 325; Taiwan 450; Colombia 15; Costa Rica 40; Dominican Republic 600; Haiti 30; Mexico 700; Nicaragua 55; Panama 15; Peru 350; Philippines 1,500; Argentina 250; Brazil 1,900; Ecuador 60; El Salvador 18; Guatemala 25; Paraguay 20; Australia 700; Fiji 200; British Guiana 200; British Honduras 30; Federation of West Indies 300; India 200; Mauritius 200; Belgium 50; Denmark 60; France and territories 200; West Germany 75; Ireland 10; Netherlands 60; Turkey 100. This does not include the United Kingdom, Canada and Hong Kong which have small quotas.

Domestic (#7) spot raw sugar prices declined from 6.41 at the beginning of January to 6.31 at the end of that month, and were still at the latter level on February 10th.

## Sugar Prices—February 10, 1961

| | |
|---|---|
| **Duty Paid Bulk (#7) Raw Sugar N.Y.** | **6.31** |
| **Average #7 Raw Sugar Jan. 1 to Feb. 10** | **6.37** |
| **Refined Sugar Gross N.Y.** | **9.55** |
| **#8 Raw Sugar (f.o.b. and stowed)** | **2.95** |
| **Average #8 Sugar Jan. 1 to Feb. 10** | **3.03** |

| *Future Prices* | *Contract #8* | *Contract #7* |
|---|---|---|
| **March 1961** | **2.88** | **6.35** |
| **May 1961** | **2.90** | **6.32** |
| **July 1961** | **2.87** | **6.37** |
| **Sept. 1961** | **2.89** | **6.39** |
| **Oct. 1961** | **2.89** | —— |

Refined beet sugar prices were reduced 20¢ per 100 pounds, effective January 16th, in the Chicago-West territory, making the basis price $8.60 for paper bags. Later, it was announced that the $8.80 price would be resumed January 24th, but business would be taken at the $8.60 price for delivery through March 31st. A cane refiner on January 23rd rescinded its previously announced advance of 20¢ per 100 pounds in the Chicago-West territory, and took day-to-day business at $8.80 f.o.b. San Francisco.

Hawaiian sugar workers returned to work on February 2nd, after a one-day strike. Negotiations were resumed on the contract which terminated January 31st. In 1958, a strike lasted four months with serious damage to the sugar crops, and its effects are still being felt. In Puerto Rico, the Association of Sugar Producers and the United Packing House Union reached an agreement calling for higher wages for sugar cane workers.

Trading in the old and new #6 (bag, domestic) sugar futures contracts was suspended February 1st by action of the Board of Managers of the N.Y. Coffee & Sugar Exchange, Inc. Trading prior to that time had been concentrated in the #7 (bulk, domestic) contract, reflecting the changeover to bulk operations by refiners and shippers.

World (#8) spot sugar prices advanced to 3.06¢ per pound in mid-January, but then declined on news of resales of Cuban sugar. Moreover, early in February it was reported that the Cuban Bank sold Ceylon two cargoes of raw sugar at a price equivalent to about 2.83¢ f.a.s. Thus, the long argued question of whether Cuba would maintain its minimum price of 3.25¢ per pound in the world market apparently has been answered. The #8 spot price, which is f.o.b. and stowed, on February 10th was 2.95¢.

Cuba has set a definitive price of 3.64¢ per Spanish pound as the base for making payments to its agricultural units participating in the production of four million metric tons of 96° sugar, according to the newspaper *El Mundo*. (This is the quantity recently mentioned in connection with the sale to the communist-bloc at 4¢ per pound). Cane ground in excess of that needed to produce four million tons of sugar will be liquidated at a provisional price of 2.50¢ per pound, but final payments will be higher if the selling price warrants. This reportedly is covered in Decree #2933, dated January 18, 1961, which sets a World free market quota of 1,992,187 Spanish long tons; a domestic quota of 350,000 tons; and an Obligatory Reserve of 292,969 tons. The rest of the Cuban production will be placed in a Voluntary Reserve for the World Market.

F. O. Licht, the German sugar authority, increased 1960/61 production estimates for several countries in Western Europe by about 862,000 short tons, raw value. Assum-

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ing the unreported countries are unchanged from the previous estimate, this presumably would raise the production total for Western Europe to about 11,636,000 short tons versus 8,711,000 short tons for 1959/60. France's estimate was raised by 551,000 short tons to 2,976,000 compared with 1,176,000 short tons last season, and West Germany was increased to 2,205,000 short tons against 1,567,000 for 1959/60.

Although Castro has decreed unrestricted production this year, yields were reported to be low late in January. The average yield, at that time, was reported to be about 2½% below the comparable yield in 1960. Moreover, the use of volunteer cane cutters to replace experienced workers on military duty also will hurt the outturn. If these conditions continue, Cuba will be lucky to produce five million tons of sugar, B. W. Dyer & Company concludes.

## Report From Cuba

New York, February 10, 1961: Sugar production in Cuba for 1960 amounted to 6,461,528 short tons; and 287,371,395 gallons of blackstrap molasses. According to ICEA sugar stocks in November 15, 1960 amount to 1,982,715 short tons.

Total sugar exports, raw and refined, raw value, for ten months of 1960 to October 31 were 5,279,417 short tons. Similar figures for several previous years: 5,426,000 on the same date in 1953; 5,280,382 for 1956; 5,403,896 for 1957 and 5,622,683 for 1959.

Average price for raw sugar in 1960 was 3.43 cents per pound; or 21 points below the 3.64 provisional price on which payments were made to colonos. It is also 1.27 cents below the price of 4.70 cents fixed to pay sugar workers wages. According to official reports such a difference amounts to $22,000,000 absorbed by the Government in order to protect workers and small sugar cane planters.

It is probable that the 1961 crop may reach 6,815,000 short tons according to *Cuba Económica y Financiera;* and perhaps more on account of the amount of cane in the fields.

Until November 30, 1960 production of anhydrous alcohol was 176,909,159 liters and Natural Alcohol 49,846,158 liters.

Another important report in information according to *Cuba Económica y Financiera* deals with the problem discussed for more than thirty years on the necessity to reduce active sugar mills eliminating those of low efficiency due to obsolete equipment, localization and other causes. The plan is to operate only low cost units able to meet competition on sugar markets.

The date on which this plan is to start is unknown. The purpose is to establish other production sources at least equivalent to those closed not to impair zones and workers. One sugar mill in Manzanillo, Oriente Province, will not grind in 1961.

## Final Figures on Hawaiian Crop

Honolulu, Jan. 31, 1961: Official production figures for the 1960 Hawaiian sugar crop show that 935,743.96 tons of 96 degree raw sugar were made last year.

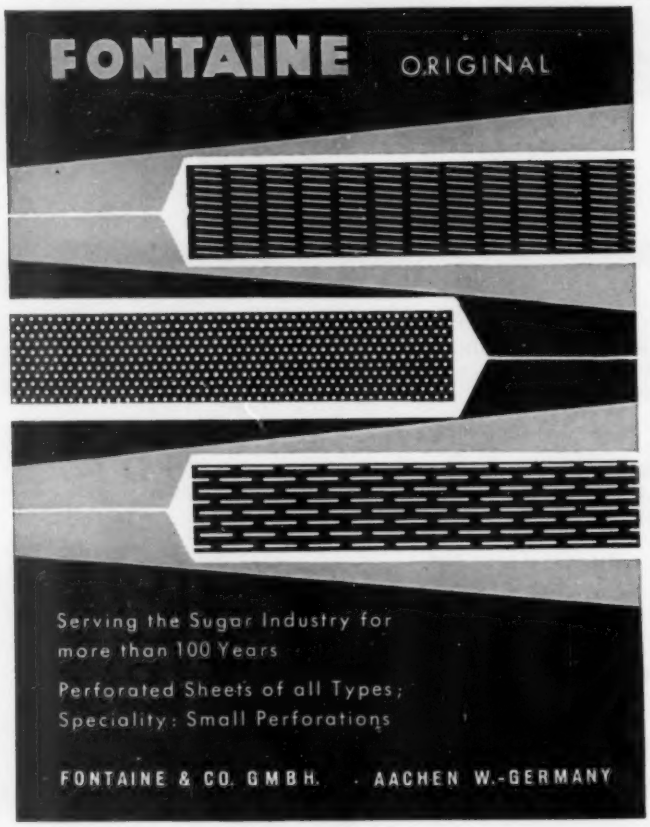
Average per acre yield was 9.03 tons of sugar. This is an improvement over the 1959 average of 8.83 tons, but lower than the 1958 figure of 9.09 tons per acre in 1958.

Normal yields for the Hawaiian industry's 18 to 24 month crop average more than 10 tons of sugar per acre.

Average yields for the 1960 crop were:

- Island of Hawaii—7.91 tons per area (unirrigated)
- Island of Maui—10.51 tons per area (irrigated)
- Island of Oahu—10.93 tons per area (irrigated)
- Island of Kauai—8.47 tons per area (irrigated & unirrigated)

Highest yield in sugar per acre last year was scored by Hawaiian Agricultural Co. on the Island of Hawaii. The average was 12.59 tons. This is unusual, as the plantations on the Island of Hawaii are mostly unirrigated and as such generally have lower per acre sugar yields than plantations on other islands which have a much higher degree of irrigation.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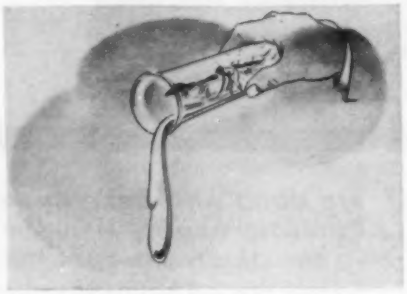

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Other 1960 Hawaiian industry-wide statistics are shown below, with 1959 figures in parenthesis:

Total cane land acreage, 224,617 (222,588); acres harvested, 103,584 (110,371); total cane used for sugar, 8,613,317 tons (9,416,225 tons); average yield of cane per acre, 83.15 tons (85.31 tons); raw sugar made per ton of cane, 217 pounds (207 pounds).

---

Another step in the export of Hawaii's sugar know-how has been taken with C. Brewer & Co.'s announcement that they have reached tentative agreement to provide management service for a large Ecuador sugar plantation.

C. Brewer & Co. will provide service through their wholly-owned subsidiary, Hawaiian Agronomics Co. (International). The company to be served is the Sociedad Agricola e Industrial, C.A. of Guayaquil, Ecuador.

Hawaiian Agronomics was formed to provide Hawaiian management skills to other sugar producing areas of the world, and the Ecuador assignment will be its second major contract by the Brewer organization. For the past three years the firm has been assisting in building a sugar industry in Iran.

The Ecuador company's plantation covers 25,000 acres and is located 35 miles east of Guayaquil. It produces about 70,000 tons of refined sugar annually. Ecuador is a self-sufficient sugar nation, normally producing about 150,000 tons a year.

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Production of newsprint from 100% bagasse has been developed within the last year according to Dr. L. D. Baver, director of the Hawaiian Sugar Planters' Assn. Experiment Station. (A run was made of 100% bagasse paper by one of the local Honolulu newspapers last year. Results were comparable to ordinary newsprint but the paper lacked strength when run through the presses, it was reported.)

The research director says that most of Hawaiian studies have been made in cooperation with Crown-Zellerbach laboratories in Camas, Washington. It has been found that methods for making paper from wood pulp can be adapted to the making of bagasse paper.

Hawaii produces about 1,000,000 tons of bagasse yearly, Dr. Baver told the engineers. Most of it is now used as fuel in the mills. The question of whether it is feasible to put up small enough plants to produce bagasse paper for the Hawaiian market is under consideration. Only some 60,000 tons of paper of all kinds is consumed annually in the state and high shipping and power costs prevent the economic exportation of Hawaiian bagasse paper, Dr. Baver said.

The boards of directors of American Factors, Ltd. and Pioneer Mill Co. and Oahu Sugar Co. have completed reorganization of their corporate structure, making the two sugar companies subsidiary organizations of the parent company.

C. H. Smith, president of Amfac, said, "the reorganization will afford the most economical and efficient means of developing the businesses and larger properties of these companies.

"It is expected that economies will be effected in the fields of accounting and corporate financing."

Mr. Smith noted that the rate of growth of the three companies lies in further development and diversification of their activities.

The reorganization means exchange of stock. The ratio is one share of Amfac for one of Oahu Sugar, and 1.1 shares of Amfac for one of Pioneer Mill Co.

Pioneer Mill Co. was started in the early 1860s. A crop of 1,708 tons of sugar was produced in 1876. In 1957, the last normal year before the 1958 sugar strike, Pioneer Mill production was 62,232 tons. Oahu Sugar Co. was formed in 1897 and had a crop of 7,891 tons. In 1957, production was 71,874 tons. It is now the largest plantation on Oahu.

---

Several important changes have been made in Hawaiian sugar industry management positions.


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Harold C. Eichelberger has been named senior vice president of American Factors, Ltd., a move which insures he will become president of the firm when C. Hutton Smith retires in 1963. American Factors is the largest single sugar producer in the Islands. Their wholly-owned subsidiary, American Factors Associates is a major operator in offering management and research services to international sugar areas.

Douglas B. Thompson, formerly assistant manager of Waialua Agricultural Co., has been named assistant manager of Hawaiian Commercial & Sugar Co., on the Island of Maui. He replaces Frank Churchill, long-time assistant manager for HC&S, who is now manager of McBryde Sugar Co. on the Island of Kauai. HC&S is the largest sugar plantation in the U.S.

John T. Moir III, president of the Hawaiian Sugar Technologists for the current year, is moving to C. Brewer's Hilo office to become industrial engineer. Mr. Moir has been with Kekaha Sugar Co. on the Island of Kauai, 14 years. He was director of industrial relations and industrial engineering prior to resigning to accept the Brewer position.

## Puerto Rican Bagasse Plant Sold

San Juan, January 31, 1961: The International Paper Company has purchased the paper plants operated by W. R. Grace Co. in Mexico and Puerto Rico. In addition, the International Paper Co. will be associated with Grace in the establishment and operation of a pulp and paper plant that is being completed in Cali, Colombia. The paper plant from Puerto Rico will be operated under the name of Puerto Rico International Paper Company Limited. This plant located in the near Central Cambalache in Arecibo, has been for some time manufacturing cardboard paper from a mixture of bagasse and waste paper. R. C. Doane, president of the International Paper Co. has announced that the Puerto Rican plant will intensify research for the purpose of manufacturing newsprint paper from bagasse.

The Board of Directors of the Sugar Producers Association of Puerto Rico has elected the following officers for the year 1961: Eugene F. Rice, as president and H. H. Oliver as vice president. Mr. Rice is president of Central Aguirre Sugar Co. and Mr. Oliver is vice president and general manager of South Porto Rico Sugar Co. The outgoing president of the Association, Mr. Manuel A. del Valle, who had served in that capacity for four years, was elected president emeritus in consideration of his outstanding work for the Association and the sugar industry to which he had devoted many years of valuable services. Governor O. L. Freeman, the new Secretary of Labor, invited Mr. Del Valle to a conference held in Washington on January 26 for the purpose of discussing the agricultural policies and programs of the nation.

---

Representatives of the Sugar Producers Association had a meeting with governor L. Muñoz Marín where the following matters were discussed: federal sugar legislation affecting Puerto Rico and need of increasing sugar production in the island; minimum wage laws and pending legislation; 1961 cane crop and approval of labor contracts; and the enforcement of the new legislation concerning the regulation of truck transportation. The Association also presented its views to Rep. Adam Clayton Powell, president of the Education and Labor Committee, in relation to the proposed legislation for raising minimum wages in industries.

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With satisfactory results Central Coloso has continued this year's grinding operations using the automatic control of conveyor which had been tried successfully in the previous campaign. With this system of automatic feed control, the grinding rate of cane has been increased by a margin of over ten tons per hour. This increase has been achieved as a result of less down time during grinding as compared to manual control with visual indications. A detailed description of this system of conveyor automation was presented by Mr. E. Sotomayor in a paper that he presented at the annual meeting of the Sugar Technologists Association held last December in San Juan.

## Louisiana Produced 466,530 Tons

New Orleans, La., February 3, 1961: The weather in the Louisiana sugar district has not been good during the month of January but this part of the country has been so much better off than the rest of the nation that there is little room for complaint. The job of harvesting the 1960-61 cane crop was completed before the really bad weather arrived and the Louisiana cane farmers can take the cold and the rain with less inconvenience now than at any other time of the year.

The crop just completed was not as bad as the early grinding estimates indicated and Louisiana produced 466,530 short tons of sugar, raw value, according to the preliminary report of the Louisiana State Office of the ASC. This compares with 440,400 tons of sugar produced from the 1959 crop.

Gilbert Durbin, General Manager of the American Sugar Cane League, reported after the completion of grinding operations that the Louisiana sugar mills had ground approximately 6,000,000 gross tons of cane which is equivalent to about 5,550,000 net tons of cane after trash deductions. He estimates that approximately 497,000 additional tons of cane were used for seed to plant cane for future harvests, which increases the total to 6,047,000 net tons of cane for the 1960 crop.

The acreage harvested for sugar and seed totaled approximately 292,000 acres which is seven percent more than the acreage used for the 1959 crop. It is estimated that the cane used for seed was from 24,000 acres and that cane for sugar production was from 268,000 acres.

The cane yield per acre from the 1960 crop was about 20.7 net tons compared to 20.3 tons a year earlier. The yield of sugar per acre, however, was 167 pounds whereas the 1959 crop produced 174 pounds of sugar per acre.


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## Two Boiling System

(*Continued from page 34*)

*G. A. GEMMERL-SMITH (Australia):* Does a rising purity of cane force you to go from two to three massecuites? If so, at what stage of purity is the change made? If not, what final molasses purity are they willing to accept?

*Mr. MASCARÓ:* On the basis of 85 purity syrup you can handle with efficiency all the boiling work with two-massecuite system. If syrup purity increases to 86-88 we must put in some first molasses to first massecuites. Because there are advantages we prefer to do that instead of using the three-massecuite system. But if you have 89-90 or more purity syrup, I believe you must go to the three-boiling system.

*K. DOUWES-DEKKER (So. Africa):* What is the purity of the sugar from the final massecuite from which you make magma?

*Mr. MASCARÓ:* About 90.

*Mr. DOUWES-DEKKER:* With what liquid do you mix the sugar to prepare the magma?

*Mr. MASCARÓ:* We use molasses or syrup.

■

## Hon. Ellsworth Bunker To Address S.I.T.

The Twentieth Annual Meeting of the Sugar Industry Technicians will have the

unusual honor of being addressed by The Honorable Ellsworth Bunker at the banquet of the association on the night of May 8th according to an announcement by G. E. Waring, president of S.I.T. Mr. Bunker combines a thorough knowledge of the sugar industry with world-wide experience in international diplomacy. The fact that he is to be the speaker at the forthcoming meeting is a fitting climax to more than twenty years of service by S.I.T. to the sugar industry and, in a sense, epitomizes the recent trend of the organization toward a more international character.

Mr. Bunker is well known in sugar circles as former chairman of the board of National Sugar Refining Company. He was also director of Central Aguirre in Puerto Rico, Guantanamo Sugar in Cuba and Potrero in Mexico. Such a background in the sugar industry makes Mr. Bunker an unquestioned authority on the industry; but perhaps of even more importance today is his diplomatic experience. He served as U.S. Ambassador to Argentina in 1951, U.S. Ambassador to Italy in 1952, U.S. Representative to the United Nations General Assembly and as Ambassador to India in 1956.

It is a measure of the growing international prestige of the Sugar Industry Technicians that members and guests will have the privilege of hearing a message from Ellsworth Bunker at the annual banquet on the evening of May 8th in connection with the 20th Annual Meeting to be held in New York at the Sheraton-Atlantic, May 7th through the 9th, 1961. Attendance is expected to exceed that of all other meetings with delegates from a number of foreign countries as well as the large U.S. group to hear and discuss papers of immediate importance to sugar refiners throughout the world as well as the symposium that concludes the meeting dealing with the all-important subject: "Instrumentation and Vacuum Pan Control in Sucrose Crystallization."


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# SUGAR ABSTRACTS

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**by Special Arrangement with**

**SUGAR y AZÚCAR — Professor Mario A. Mascaró, Editor**

## Agriculture

### Control of the Sugar Cane Borer with Endrin

W. H. LONGETAL, *Sugar Bulletin, Vol. 38, No. 16 (1960)*

The weight of accumulated data points conclusively to the fact that endrin is a far better chemical for controlling the sugarcane borer than any other that has been so thoroughly tested at this time. For this reason it is the only insecticide currently recommended by the Louisiana Agricultural Experiment Station for borer control on sugarcane.

Four biweekly applications of 2% endrin granules broadcast at the rate of 12 pounds per acre have given very good control of second and third generation cane borers. During 1958 the average total cost of four airplane applications of endrin granules was slightly less than $10.00 per acre. This means to the grower that he must obtain an increase of slightly more than 1 ton of standard cane per acre to pay for the cost of treatment. The data reported herein show average yield increases ranging from 6 to 11 tons of cane per acre following treatment with endrin.

■

### Effect of Soil Fumigation on the Growth of Sugar Cane

H. T. CHU and T. K. TSAI, *Report Taiwan Sugar Experiment Station, No. 20, pp. 73-90 (1959)*

Previous work had shown that soil fumigation may insure better growth and higher yield of sugar cane, and this conclusion has been confirmed by further experimentation in which four kinds of soil fumigation materials—D-D mixture, Ortho-fume 85, Chlorofin and formalin—were used in both Spring and Autumn plantings on five plantations representing different soil types over a period of two years. The effects of the treatments on growth and yield and on the nematode population of the soil were noted. Ortho-fume 85 was generally the most effective, giving yield increases in some cases of over 20% in both spring and autumn plantings. Nemotode counts showed large increases, even with formalin, which is not known to be fatal to nematodes, which suggests that it might have a lethal effect on some other microscopic pests. The largest percentages of yield increase were found in areas where the soil was sandy or sandy loam. In all cases the percentage of germinated cuttings was above 90.

■

### New Concept On Land Preparation Using Crawler Tractors With Plowing Harrows

*By* OVIDIO GONZÁLEZ, *Puerto Rican Sugar Technologists Annual Meeting 1960*

Three main aspects were involved in replanting large plantations of sugar cane after destroying the old stools in Puerto Rico during the last two planting seasons of 1959 and 1960. These are economical, agronomical, and time factors. The cost of land preparation up to the point of furrowing has been reduced up to 50% with the use of crawler tractors, Caterpillar D7 size, and Rome Plowing Harrow with ten (10) notched discs of 36 inch diameter, 7 feet width of cut and 12" to 14" depth.

The rear gang of five (5) discs cuts at 50" in relation to the front gang without altering the soil profile. At the same time it mixes uniformly the cane trash, old stubbles and organic matter without the need of burning. Due to the shortage of land in Puerto Rico no crop rotation is practiced in cane growing and, therefore, from the agronomic standpoint of view the soil profile should be maintained in its natural condition and no subsoil brought to the surface.

With this equipment plowing an average of two (2) cuerdas per hour, a large amount of land can be planted in a short time before the heavy rains start. In this way the cane is planted in the proper time and the growing season is extended for larger production.

■

## Technology

### Property Changes of Amberlite IRA-401 (Cl) During Long Term Operation in a Refinery

KAZUMASA SUZUKI, *Proceeding, Research Society Japan Sugar Refineries' Technologists, Vol. 8, pp. 22-29 (1959)*

A two-year study of change in physical and chemical properties of this Amberlite used for decoloration led to the following results: After 240 cycles there was a 10% decrease in physical strength due to degradation of the polymer structure. Absolute density showed an increase due to irreversible absorption (fouling) by organic and inorganic impurities. The amount of water absorbed by the swelled resin was higher with used than unused, but the reswelling property of dried resin decreased with the cycle and its shrinking ratio in an electrolyte solution also decreased. It was concluded that these changes depend less on the concentration of the exchange radical than on the degradation of the polymer structure and the absorbed fouling substance. There was a 40% decrease in the salt-splitting anion capacity; and about 60% decrease in anion exchange capacity. In every cycle about 30% of the attacked strong basic groups always remained as weak basic groups. The resin used for decolorization was regenerated with a NaC10 solution. But the treated resin lowered considerably the pH of the effluent when put into use after regeneration. This adverse result was countered by treatment of the resin with a 3.5% soda ash solution of 40°C. In spite of the mentioned changes of properties, the decolorizing capacity was not greatly diminished. It seems that the life of the resin depends on the fouling conditions and the physical strength of the resin.

## Use of Phosphates as Scale Removers

FRANZ STEINBRUNN, *Zucker, Vol. 12, No. 7, p. 175 (1960)*

For boiling-out of evaporators during or at the end of the campaign, trisodium phosphate gives better results than caustic soda. In this method the alkaline-earth component of the scale is transformed into amorphous phosphate, and in the most favorable case can be flushed out by a stream of water; but in any case, the hardest scale is loosened and in most cases can be removed by a simple scraping. The trisodium phosphate is used as a 3 to 5% solution which is boiled for a sufficient length of time. If the boiling can be done under pressure, the time of boiling may be shortened.

Where the scaling material consists mainly of carbonates of lime and magnesia, it may be removed by a 5 to 8% solution of phosphoric acid. This method is much less corrosive than a hydrochloric acid solution, because the free phosphoric acid exerts practically no action on metallic iron. Another phosphoric acid product that is even more protective is carbamid phosphate. This material is a compound of urea and phosphoric acid, which is a crystalline salt and easy to handle. An 8 to 10% carbamid phosphate solution dissolves carbonate scale and gives off carbonic acid gas which is so buffered with urea that it is harmless to iron. The same solution can be used over again for as long as it gives off carbon dioxide.

■

## Division of Roller Load in the Three-Roll Mill

*Sugar Research Institute, Mackay Technical Report No. 56 (1958)*

Investigations described indicate that prediction of roll loading from press tests cannot be regarded as reliable. Results from the experimental mills and direct tests on a new mill at Fairymead suggest a ratio of delivery to feed load roll within the range 2 to 5/1.

■

## Foliear Application of Urea At Mercedita

*By* FRANCISCO CARBERAS, *Puerto Rican Sugar Technologist Annual Meeting 1960*

Several years ago extensive soil analysis throughout the Mercedita cane lands brought out the fact that the cultivated lands were high in P and K, almost to the point of excess. Furthermore, the lands were on the slightly to considerably alkaline side. This being the case the P & K in the soil was sufficient for a considerable number of years, since their availability had a natural control.

With the aforementioned situation, the Mercedita Field Staff has conducted an extensive search through experimentation for the most economical and efficient source of nitrogen for their crops. For a time anhydrous ammonia mechanically applied on the flat lands, and ammonium sulphate applied manually on the slopes proved to be the best method. As time passed the picture began to change.

The below mentioned factors that progressively got worse forced us to resume our search for a more economical source of nitrogen.

In the case of the mechanical application of anhydrous ammonia, the situation was as follows:

1—In our predominantly clayey soils two passes had to be made, the first one to loosen the soil. This operation almost doubled our costs.

2—A considerable but immeasurable amount of ammonia was lost during its application from seepage.

3—Operators for the equipment were virtually impossible to get. They greatly feared the distasteful odor of the ammonia gas. The few we did have thought nothing of running with their ammonia tanks dry for hours on end, for the reloading was the most distasteful part of the whole operation.

4—Our equipment was getting old and we were aware of the very large capital investment necessary to replace this equipment.

In the case of ammonium sulphate the problem was also one of economics. We considered the double handling, transportation, storage, and application costs excessively high for the amount of nitrogen actually handled. This being magnified by the uneven nature of the terrain where this material was used.

Three years ago we started experimenting with urea. This material has a 46% nitrogen content and has an almost neutral effect on the soil. In its prill form it is easy and comfortable to handle, but care must be taken not to damage the bag's polyethylene lining until ready to use due to highly higroscopic qualities.

We obtained excellent results in both manual and aerial applications. Our experiments proved it to be such an efficient source of nitrogen that we were actually able to reduce our N#/acre standard throughout all our farms. Previously we were applying approximately 165 lbs. N/acre: this we now reduced to 138 lbs. N/acre with an increase in yield, as our last two crops will show, that can be attributed in part to this new method of fertilization. As we convinced ourselves that foliar applications were as productive as the ground type, we were aware of the number of advantages of this method over the latter. There was one drawback, however, our aerial spraying subsidiary's Piper type aircraft could not handle the heavy applications. The problem was solved with the acquisition of the Grumman "AG-CAT." This aircraft can easily apply up to 300 lbs. of urea per acre.

At present we have 2,000 acres of cane land under aerial fertilization with urea. We are presently trying two different variations. One being of two 150 lbs. applications at 7 and 14 weeks after harvesting and the other of one 300 lbs. application at 12 weeks after harvesting. Both methods show good vigorous growth, but the final decision as to costs and production will be, of course, after these fields are harvested.

I would like to point out the more obvious advantages of aerial fertilization:

1—The most efficient and even application of fertilizer we know of.

2—A tremendous reduction in costs due to storage, double handling, hauling & wages.

3—A supervisory and bookkeeping relief for the Majordomo giving him more time to attend other chores particularly during the harvest.

4—A tremendous savings in capital investment, and maintenance compared to the mechanical applicators.

5—Work can continue right after a rain. Mechanical applicators have to wait for the fields to dry out.

6—Aerial applications will not disturb the pre-emergent film of any herbicide applied on the field. Mechanical or manual applications will.

7—One AG-CAT can handle up to 400 acres in one day. A good insurance, the work gets done on time.

8—The only solution for fertilizing on time in those areas where labor is scarce during the harvest.

We are so enthusiastic about this operation and with the results we have had so far that another subsidiary, Southern Agricultural Chemicals, Inc. obtained the representation of an excellent quality urea in order to assist sugar cane farmers who may be interested in this operation. We, in Mercedita, expect to have this operation generalized throughout most of our cane lands by next year.

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## Koffsky Addresses Sugar Club

"The task of forging a sugar policy in this changing world is difficult. It is complicated by the vested interests introduced in the past, by decisions that must be made with respect to Cuba's future role in our sugar market, by the restiveness of our domestic producers under quota controls—particularly the strong desire of new areas to enter the market, by the wide hopes of foreign suppliers to participate in what they consider to be an attractive market, and by the many facets of our foreign policy" said Nathan M. Koffsky addressing the Sugar Club luncheon on February 16th in New York. Mr. Koffsky, chairman of a special U.S. Department of Agriculture Study Group on Sugar was introduced to the members by Congressman Harold D. Cooley, chairman of the House Committee on Agriculture. The Study Group's report (see page 31) has attracted wide attention because of its possible influence in determining the kind of sugar law that will succeed the present Sugar Act due to expire March 31st.

## New Puerto Rico Cane Variety

The Agricultural Experiment Station of the University of Puerto Rico has developed a new cane variety, P.R. 1013, which gives high yields of sugar. It has proved superior to all commercial varieties now on the island. The variety is a cross between Co. 281 and P.O.J. 2878. It is sweeter and has thicker stalks than its sister cane, P.R. 980. The new variety is expected to improve the situation of the sugar industry on the island which has failed to produce its market quota.

## Sugar In The Oil Industry

Oil under pressure is carried into drilling wells through one inch lines that taper to three-quarter inch inside diameter for the purpose of operating hydraulic pumps. In a short time these pipes become coated with paraffin and must be cleaned. The drilling rig must be shut down while the pipes are being cleaned out. A recently patented system provides for cleaning these pipes by inserting hard candy balls which are pushed along under pressure cleaning the paraffin without shutting down the well. The hard candy balls fit into the one inch pipe; by the time they have reached the three-quarter inch pipe they have dissolved sufficiently to make a tight fit. Finally the remains of the candy ball are held in a screen at the pumps until entirely dissolved.

■

## Diesel Powered "Jeep" Available

Three export models of the four-wheel drive "Jeep" vehicle are now available with a new four-cylinder diesel engine manufactured by the Perkins Group of England, it was announced at a press conference in New York on February 1, 1961. Known as the Four 192 model, the Perkins diesel is available on export models of the CJ-5 and CJ-6 "Jeep" Universal and on the one-ton pick-up truck. Despite the slightly higher initial cost, the diesel power plant will offer sugar planters and sugar mill operators marked advantages in lower running and maintenance costs in areas where diesel fuel is cheaper and easier to obtain than gasoline.

"Jeep" vehicles in these models have a gross weight of 3,750 to 6,000 lbs., are distributed for export by Willys-Overland Export Corp. and Willys Overseas S. A.

The Perkins diesel engine develops 62 hp. at 3,000 rpm. and has a 192.4 cu. in. piston displacement. This compares with the "Hurricane" gasoline engine with 72 hp. at 4,000 rpm. and a piston displacement of 134.2 cu. in. Maximum torque in the diesel is 143 ft.-lbs. at 1,350 rpm. Perkins diesel engines are in use for a wide variety of services in 166 countries around the world.

*The Perkins diesel engine installed in a "Jeep" four-wheel drive unit was exhibited at a press conference in New York where the availability of this diesel powered unit for export was announced. It is designed to provide rugged operation, lower operating and maintenance costs in foreign sugar and other areas.*

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# Extractos del Reporte del Grupo Especial de Estudios sobre Azúcar



**por Alexander C. Muir,**
**Administrador Departmento de Investigaciones y Estadísticas**
**B. W. Dyer & Company**

El reporte del Grupo Especial de Estudios sobre el Azúcar, presidido por Nathan Koffsky, fué dado á la publicidad alrededor de Febrero primero. El estudio fué hecho á solicitud del Comité de Agricultura de la Cámara de Representantes en conexión con ". . . redactar una nueva ley azucarera, ó por lo menos hacer importantes enmiendas á la ley actualmente vigente . . ."

Algunos extractos son los siguientes:—

. . . "Mirando hácia la próxima década, los Estados Unidos no tienen porqué temer que el vacío creado en el tradicional flujo de azúcares de Cuba á los EE.UU. pueda dar lugar á una escasez de azúcar. . . . á los precios actuales pagados por los EE.UU. á los abastecedores extranjeros, casi nueve millones de toneladas resultarán asequibles para el mercado americano en 1970 . . . ésta cifra compara con nuestras importaciones totales por 4.5 millones de toneladas en 1959.

. . . "La industria azucarera doméstica tambien puede expansionar substancialmente su capacidad bajo los actuales precios para el azúcar y bajo la presente relación de precios con otras cosechas competidoras. . . . los productores de azúcar domésticos pueden llegar á producir sobre ocho millones de toneladas para 1970 en comparación con . . . 5.7 millones de toneladas estimados para 1961. . . . la capacidad potencial para producir domésticamente unas dos y medio millones de toneladas más de azúcar para 1970, comparado con 1961, implica un aumento de unas dos millones de toneladas de azúcar para las áreas de remolacha, unas 300,000 toneladas para las áreas continentales de caña, y 200,000 toneladas para las áreas domésticas fuera de nuestras costas.

. . . "Desde el punto de vista del abastecimiento luce claro que la economía de los EE.UU. razonablemente puede esperar llenar sus necesidades de azúcar á precios significativamente más bajos, durante la próxima década, que los precios que han prevalecido . . . las necesidades azucareras pueden llegar á un total de 10.3 millones de toneladas en 1965 y 11.3 millones en 1970, en comparación con 9.5 millones en 1960. El nivel del azúcar necesaria para 1970 es alrededor de cinco y medio millones de toneladas menos que el total proyectado de azúcares disponibles bajo las condiciones actuales de precios y nó restricciones.

. . . "Nuestro sistema de cuotas ha sido concebido para dar alrededor del 55% de nuestro gradualmente creciente mercado azucarero á los productores domésticos y 45% á un grupo selecto de abastecedores extranjeros; con alrededor de dos terceras partes á Cuba antes de mediados de 1960. El abastecedor extranjero se ha beneficiado con precios substancialmente más altos . . . con una prima en el precio sobre sus cuotas sobre dos centavos libra en comparación con el "mercado libre mundial." Este último no es completamente representativo de los precios mundiales por el hecho de que alrededor del 60% del comercio mundial azucarero se desenvuelve bajo arreglos especiales . . . Los productores domésticos se benefician por los precios más altos resultantes de la "cuota-prima" y la tarifa. Adicionalmente, el productor de los EE.UU. recibe un pago directo que promedia 0.7 centavos por libra . . . financiado por un impuesto sobre consumo de 0.5 centavos por libra . . .

. . . "De este modo, en un gran sentido y alcance, las metas y objetivos de nuestra legislación azucarera han sido realizados. Se ha mantenido la industria doméstica, y los productores continentales han mostrado un vigoroso crecimiento en los años recientes. Los países extranjeros, . . . han recibido más por sus ventas á los EE.UU. . . . obteniendose apoyo para nuestras exportaciones á éllos. En lo que respecta al consumidor, el sistema ha provisto un abastecimiento seguro y adecuado, tal vez con un márgen de seguridad más allá de lo realmente necesario. Hasta qué punto el precio pagado por los consumidores es más alto del necesario . . . es una cuestión de apreciación. El precio al menudeo del azúcar desde 1947-49 ha estado libre de cambios bruscos. Ha subido algo más que los precios al menudeo de los alimentos en general, mayormente porque los precios á los productores de las cosechas azucareras han sido mejor mantenidos que los precios de la mayoría de otros productos agrícolas. En el pasado, durante períodos de tensión internacional ha habido veces . . . en que el precio de los azúcares crudos en el "mercado libre mundial" ha subido substancialmente sobre el precio en los Estados Unidos . . . En éstos períodos los abastecedores extranjeros han continuado satisfaciendo sus cuotas con el fin de proteger sus intereses á largo plazo en nuestro mercado. Adicionalmente, el margen entre los precios del azúcar crudo doméstico y los precios del refino al menudeo es casi la mitad del precio total al menudeo y en la mayoría de los alimentos el márgen ha aumentado persistentemente á través de los años, aunque en general menos para el azúcar que para otros alimentos. Así vemos en período reciente que mientras los precios de los azúcares crudos han vuelto á los niveles de hace un año, el precio del azúcar refino al menudeo nó.

. . . "solamente una tercera parte de nuestro azúcar se consume directamente en los hogares y la cantidad está disminuyendo. Más de la mitad se consume en la forma de productos alimenticios procesados . . . En éstos el valor del azúcar es un pequeño porciento del valor total del producto, usualmente entre el cinco al diez porciento. Es una cuestión compleja saber qué cantidad pasa y beneficia al consumidor en cualquiera reducción del precio del azúcar que pueda conseguirse.

"Al considerar cualquier acción importante hácia el incremento de la producción doméstica para depender menos de los abastecedores extranjeros, hay que tener en cuenta que el aumento en empleos y en actividad económica originada por una elevación aguda en la producción doméstica resulta balanceada más ó menos por reducciones para nuestras industrias de exportación. Desde este punto de vista parece bastante justificado evitar una acción rápida y substancial en un sentido solamente sin considerar el otro.

. . . "hay recursos agrícolas no utilizados y el deseo de mejorar las entradas de los agricultores en general. . . . un movimiento substancial hácia mayor producción doméstica significaría mayores inversiones y empleo para las fábricas azucareras de remolacha, aunque alguna capacidad de refinación de azúcares de caña resultaría sobrante.

"Es objetable, sin embargo, hasta qué punto un incremento de la producción doméstica proveería más empleos que un aumento proporcionado en las importaciones hechas por países extranjeros.

. . . "Los Estados Unidos están interesados en ayudar éstos países (generalmente subdesarrollados) y en promover el aumento del comercio con éllos. Cuba, en años

anteriores, abastecía dos terceras partes de nuestro abastecimiento azucarero extranjero; pero era en concordancia un mercado substancial para productos de los EE.UU.

. . . "Un aumento importante en las importaciones azucareras extranjeras sobre los niveles recientes significaría una liquidación apreciable de la industria doméstica, incluyendo más recursos paralizados en las fincas y en el resto de la industria azucarera . . .

. . . "Los EE.UU. tienen que decidir si deben reservar un lugar para la vuelta de Cuba participando de nuestro mercado azucarero. Esto tiene una directa relación con la clase de programa azucarero que se pueda seguir.

. . . "Mirando hácia el futuro . . . nosotros partimos de que la industria azucarera ha sido moldeada por un sistema de altos controles . . . por más de un cuarto de siglo. Un abrupto movimiento hácia un comercio enteramente libre sería destructor.

"Desde 1934 hemos construído una vigorosa industria azucarera doméstica. Esto ha envuelto protección en precios y otros incentivos no sólo para los cosecheros azucareros sino para otros elementos de la industria; por ejemplo, los refinadores que se benefician de una limitación estricta sobre la cantidad de azúcar refino que se puede importar para consumo directo.

"Bajo condiciones de comercio libre, donde gobiernen las fuerzas del mercado, mucha de nuestra industria azucarera doméstica no sobreviviría. Bajo la situación de abastecimiento abundante que se espera prevalezca en 1961 sobrevendría un abrupto cambio á niveles de bajos precios por la competencia extranjera. Los precios á los consumidores muy bien pueden promediar á nivel significativamente bajo . . . pero se introducirían inestabilidades en precios y abastecimientos.

. . . "Las alternativas que se presentan á los EE.UU. comprenden tres accesos básicos —cuotas, tarifas ó pagos directos á los productores . . . Hay algunas ventajas en desplegar ajustes á través de acercamientos combinados. Así, nuestro actual programa azucarero, al apuntar hácia los objetivos básicos del Acta Azucarera, descansa primeramente en cuotas; pero incorpora tambien una tarifa, un impuesto sobre consumo y pagos á los productores.

. . . "Un sistema de cuotas representa el más alto grado de control entre las diversas alternativas. Nuestro actual sistema de cuotas impone regulaciones detalladas sobre las operaciones de mercado domésticas y extranjeras y . . . la consecución de ciertos objetivos en los precios. Este amplio acercamiento tiene la capacidad de asegurar un flujo constante de abastecimientos y un alto grado de estabilidad en los precios, aislando efectivamente al mercado azucarero de los EE.UU. del mercado mundial. Pero los niveles de precios del azúcar doméstico y extranjero son comparativamente altos . . . al venderse en los EE.UU. Ambos, productores domésticos y abastecedores extranjeros, les gustaría vender mucho más azúcar á los precios que prevalecen en el mercado norteamericano.

. . . "Una cuota global es una alternativa posible á nuestro sistema actual de asignación de cuotas extranjeras. . . . una cuota global se llenaría á base del 'primero en llegar.' El premio ó sobre-precio sería absorbido por el Gobierno. Los exportadores extranjeros recibirían el precio del 'Mercado Libre Mundial.' Esta alternativa tendría la ventaja de: estar más en línea con la política comercial extranjera de los EE.UU.; no depender de ningun país específico para nuestro abastecimiento; permitir que se desarrollen nuevas áreas de producción extranjeras. Tendría la desventaja de la posibilidad de que, eventualmente, algunos países surgieran como abastecedores dominantes, dejando a los EE.UU. en la posición vulnerable por otro acontecimiento tipo 'Cuba.'

. . . "El sistema tradicional de tarifas representaría una pérdida substancial de control . . . No habría restricciones sobre donde se produce el azúcar doméstico ó de donde proceden los abastecimientos extranjeros. Las importaciones de azúcar crudo serían á los precios del 'mercado libre mundial' y en los EE.UU. el precio se movería con éste; pero á nivel más alto, dependiendo de la magnitud de la tarifa.

"Una elevada tarifa se necesitaría para proveer el grado de protección de precio que los productores domésticos han disfrutado en años recientes . . . "Si la tarifa es el único instrumento de protección, la tasa actual de derechos plenos á base de 62 y ½ centavos por cada cien libras tendría que aumentarse alrededor de $3.50 . . .

. . . "Debe notarse que para continuar el mismo nivel de protección de 1959 . . . sin restricciones de producción, traería un aumento muy considerable en la producción doméstica . . . los ingresos brutos de los productores domésticos serían vivamente mejorados . . . el aumento en los abastecimientos domésticos muy bien podría fortalecer la posición ventajosa de los industriales con relación á los cultivadores. Los consumidores no ganarían ninguna ventaja.

. . . "Hay posibles modificaciones . . . para darle atributos á la cuestión de la cuota. La tarifa *variable* . . . podría utilizarse para controlar las importaciones á los EE.UU. y al mismo tiempo el abastecimiento y el precio subiendo ó bajando la tasa de la tarifa . . . Esto puede ocasionar algunas irregularidades en los proveedores extranjeros disponibles para los EE.UU. Un sistema de *tarifa-cuota* establecería una tarifa determinada para una cantidad específica de azúcar . . . los excesos quedarían sujetos á mucho más altas tasas. Bajo ésta situación muy bien podría surgir una carrera entre los abastecedores extranjeros para llenar la cuota con la consecuencia de un movimiento errático de los abastecimientos para éste país.

Pagos directos á los productores . . . "envuelve una pérdida de control, básicamente estipula niveles de precios más bajos aproximándose á los del "mercado libre mundial" pero . . . los pagos directos á los productores domésticos aportan devoluciones por unidad hasta un nivel de precio especificado. Resultando que los precios á los consumidores serían generalmente más bajos . . . pero bastante veriables.

"Si la devolución por unidad de 1959 á los cultivadores domésticos fuera á ser mantenida, mientras que al mismo tiempo se movieran los precios hácia el nivel 'mundial,' se necesitaría un pago directo alrededor de tres y medio centavos sobre cada libra de azúcar producida en los EE.UU. (en ausencia de otros dispositivos proteccionistas) . . . el pago actual promedia 0.7¢ por libra.

. . . la magnitud de las devoluciones actuales á los productores domésticos, si se mantienen fuera del tiempo estipulado, traerían una expansión substancial en la producción á menos que se impongan restricciones.

"Estos pagos — que serían muy considerables — pueden financiarse mediante apropiaciones directas del Tesoro ó por medio de impuestos de consumo . . . el gravámen del impuesto de consumo se soportaría más ó menos igualmente por todo el pueblo. Un impuesto de consumo sobre todo el azúcar . . . de alrededor de dos centavos por libra podría usarse para financiar los pagos directos de la actual participación doméstica, pero alrededor de dos y medio centavos bien pudieran necesitarse para el final de la década . . . La ventaja para los consumidores, por precios más bajos para el azúcar, se limitaría á alrededor de tres cuartos de centavo por libra para 1970. El efecto sobre los productores domésticos—como bajo la tarifa con incentivos similares—sería favorable, envolviendo una considerable ganancia en la producción; mientras que resultaría el caso opuesto para los abastecedores extranjeros . . .

. . . "Sobre el punto relativo á los pagos directos . . . el volúmen del pago podría ser ajustado para suplir en medida aproximada su distribución entre la producción doméstica y los abastecedores extranjeros . . . Otra vez, para mantener aproximadamente la actual distribución establecida por la ley, sin restricciones en la producción, significaría un nivel más bajo de pagos á los productores domésticos—tal vez dos y tres cuartos á tres centavos por libra. El impuesto de consumo . . . podría ser algo más bajo y una prequeña reducción adicional en los precios al consumidor podría sobrevenir.

"Cada uno de los acercamientos al problema que han sido considerados anteriormente tiene sus faltas y omisiones que pueden ser mitigadas, al menos en parte, por medio de combinaciones . . . Sólo dos ilustraciones se han presentado en detalle . . . una envolviendo una combinación de

dos acercamientos al problema y la otra una combinación de los tres. El actual programa azucarero ilustra una combinación de todos los acercamientos al problema; pero con primordial confianza en el sistema de cuotas.

. . . "Finalmente, nosotros comprendemos que el Congreso necesitará considerar alternativas para una política azucarera en relación á otros objetivos nacionales, tales como nuestra política extranjera y nuestra política sobre agricultura.

"Por muchos años los Estados Unidos han dirigido sus esfuerzos hácia la reducción de las barreras comerciales y á intensificar la expansión del comercio mundial á través de la GATT. . . . Puede haber otros factores envueltos en nuestra política extranjera, tanto económicos como políticos, que pueden influír en el desenvolvimiento de la política azucarera, inspirándose en el pleno interés nacional.

Además, hay actualmente fuertes presiones para expansionar intensamente nuestra producción doméstica azucarera y ampliar las oportunidades de nuestros agricultores. Hemos observado que mientras los precios promedios de la cosecha han bajado á un nivel 15% inferior que en 1953, las ganancias por unidad se han mantenido para las cosechas azucareras. Debemos tener firmemente en la mente que la evolución en la agricultura en el período de tiempo venidero traerá un importante apoyo á la posición competidora de las cosechas azucareras con relación á otras oportunidades agrícolas."

## *Más Alta Eficiencia de Operación*

# Proceso Mejorado de Dos Templas

por

**Gerardo Fundora Jr.,**
**Centrales Cuba & Santo Domingo**

**Mario A. Mascaró,**
**Editor Técnico, Sugar y Azúcar**

**El siguiente artículo describe un proceso mejorado de dos templas desarrollado por los autores, el cual se usa con éxito por varios importantes centrales azucareros de Cuba y de otros países. Las cifras y datos incluídos demuestran las destacadas ventajas obtenibles con éste sistema al fabricar azúcar crudo. Este trabajo técnico fué presentado ante el Décimo Congreso de la Sociedad Internacional de Tecnólogos de la Caña de Azúcar, en Hawaii, y reproducido con su permiso. El artículo incluye la discusión subsiguiente á la presentación del trabajo.—Editor**

PARECE casi imposible inventar un proceso cien por cien nuevo para elaborar azúcares crudos; pero es posible ofrecer mejoras originales capaces de rendir ventajas substanciales sobre los sistemas clásicos de dos, tres ó cuatro templas.

El Proceso Mejorado de Dos Templas propuesto por los autores ofrece todas las ventajas del Sistema de Tres Templas; pero mejorándolo en varios aspectos nuevos: 1) Menor porcentaje de sólidos en las templas elaboradas por unidad de sólidos en la meladura; 2) Un solo tipo de azúcar crudo producido; en comparación con dos tipos de azúcares crudos producidos en el Sistema de Tres Templas, los cuales contienen más color, menos polarización é inferiores cualidades para refinar, almacenar y manejar, especialmente cuando los embarques son á granel; 3) Eliminación de las templas de segunda; 4) Los azúcares de bajo grado, para Magma-Semilla no requieren lavado y re-purga; 5) Aumento de eficiencia y capacidad en Tachos y Centrífugas; y 6) Economías de vapor.

El Proceso Mejorado de Dos Templas opera con dos masas cocidas: una de 83 á 85 de pureza que rinde azúcar crudo comercial de 97.5 a 98.0 de polarización sin lavado en las centrífugas; y la otra con 50 á 60 de pureza que produce azúcar para magma de semilla y miel final. Nuestra experiencia en Cuba es que templas de agotamiento con purezas superiores á 60 no rinden mieles finales debidamente agotadas.

La masa cocida de primera se enfría en forma rápida hasta 130-135° Fah. en cristalizadores equipados con unidades permutadoras de calor capaces de reducir la temperatura de la masa cocida a una velocidad de 9 grados Fah. por hora, disponiendo de un pie cuadrado de superficie de enfriamento por cada pie cúbico de capacidad en masa cocida, una revolución cada dos y medio minutos, circulando agua a 78° Fah. y á razón de 25 galones por minuto. Este tratamiento determina el aumento de tamaño y mejor forma de los cristales de azúcar; produciendo mieles de pureza menor que la pureza de la templa de segunda. La cual es á su vez la templa final. Se re-calienta la masa cocida en el mezclador á la temperatura de saturación antes de la purga.

Se toma cierta cantidad de miel de primera sin el tratamiento previo de enfriamiento rápido sobre la masa cocida, se concentra á sobresaturación entre 1.25 a 1.50, según la pureza, y operando bajo control de instrumentos se semilla con azúcar pura finamente pulverizada (semilla para

**TABLA I**
**Comparación de Varios sistemas de Fabricación**

| Sistema | Lbs. agua evaporada por tachos por hora | Lbs. vapor consumido por tachos por hora | Equivalente en B H P | Galones de agua a los condensadores por min. | Galones agua dilución de mieles cada 24/hrs. | Pies cúb. masa cocida producida 24/hrs. |
|---|---|---|---|---|---|---|
| **Spencer** | | | | | | |
| **Tres Masas Cocidas** | | | | | | |
| **Cristalización de la meladura** | 44,225 | 51,718 | 1,475 | 4,516 | 4,752 | 21,888 |
| **Saladin** | | | | | | |
| **Cuatro Masas Cocidas** | | | | | | |
| **Cristalización de la meladura** | 42,975 | 50,271 | 1,434 | 4,389 | 4,488 | 21,384 |
| **Webre** | | | | | | |
| **Tres Masas Cocidas** | | | | | | |
| **Semillamiento completo de miel** | 38,975 | 45,681 | 1,303 | 3,980 | 3,600 | 19,800 |
| **Proceso Mejorado de Dos Masas Cocidas** | | | | | | |
| **Semillamiento completo de miel y enfriamiento controlado de la Masa Cocida de Primera** | 33,975 | 39,931 | 1,139 | 3,470 | 2,424 | 17,544 |

**TABLA II**

**Dos Años de Experiencia con el Proceso Mejorado de Dos Templas en el Central "Santo Domingo"**

**Análisis del Azúcar Crudo Elaborado**

| | | | |
|---|---|---|---|
| Polarización á 20° C. | 97.85 | Cenizas | 0.40 |
| Factor de seguridad | 0.26 | Materia orgánica no-azúcar | 0.37 |
| Indicador de dilución | 35.22 | | |
| Coeficiente Glucosa/Cenizas | 1.55 | **Tamaño del grano** | **%** |
| Impurezas sólidas | 1.59 | Sobre tamiz No. 10 | 0.10 |
| Insolubles | 0.04 | Sobre tamiz No. 20 | 73.71 |
| Filtrabilidad (Elliott rev.) | 115.00 | Sobre tamiz No. 30 | 28.83 |
| Clerget (J & G IV) | 98.05 | Sobre tamiz No. 40 | 1.86 |
| Humedad | 0.56 | A través No. 40 | 0.50 |
| Azúcares reductores (M & W) | 0.62 | Tamaño promedio: 0.77 milímetros ó entre Nos. 4 & 5 | |

| Influencia del Lavado de Afinación | Sin lavado | Lavado | Removido |
|---|---|---|---|
| Polarización á 20° C. | 97.85 | 99.20 | —— |
| Azúcares reductores | .62 | .09 | 85.48% |
| Cenizas | .40 | .14 | 65.00 |
| Valor de tinte | 280 | 55 | 80.36 |
| Color (Stammer) | 58.0 | 4.8 | 91.72 |
| pH | 6.6 | —— | —— |
| Ensayo de Lavado (Horne) | 98.00 | —— | —— |
| Ensayo de Espuma (Payne) | 90-130 | —— | —— |

**TABLA III**

**Un Año de Experiencia con el Proceso Mejorado de Dos Templas en el Central "Cuba"**

**Análisis del Azúcar Crudo Elaborado**

| | | | |
|---|---|---|---|
| Polarización á 20° C. | 97.70 | Cenizas | .39 |
| Factor de Seguridad | 0.20 | Materia orgánica nó-azúcar | .35 |
| Indicador de Dilución | 31.43 | | |
| Coeficiente Glucosa/Cenizas | 2.02 | **Tamaño del Grano** | **%** |
| Impurezas sólidas | 1.75 | Sobre tamiz No. 10 | — |
| Insolubles | .05 | Sobre tamiz No. 20 | 80.10 |
| Filtrabilidad (Elliott rev.) | 112.50 | Sobre tamiz No. 30 | 17.50 |
| Clerget (J & G IV) | 97.92 | Sobre tamiz No. 40 | 2.10 |
| Humedad | .55 | A través No. 40 | .30 |
| Azúcares Reductores (M & W) | .79 | Tamaño promedio: 0.70 milímentros ó No. 5 | |

| Influencia del Lavado Afinación | Sin lavado | Lavado | Removido |
|---|---|---|---|
| Influencia del Lavado de Afinación | lavado | Lavado | Removido |
| Polarización á 20° C. | 97.70 | 99.20 | —— |
| Azúcares Reductores | .79 | .12 | 84.81% |
| Cenizas | .39 | .11 | 71.79 |
| Valor de tinte | 260 | 70 | 73.08 |
| Color (Stammer) | 38.1 | 4.8 | 87.40 |
| pH | 6.9 | —— | —— |
| Ensayo de Lavado (Horne) | 98.00 | —— | —— |
| Ensayo de Espuma (Payne) | 80-120 | —— | —— |

**TABLA IV**

**Sólidos Manipulados por los Distintos Sistemas de Fabricación**

| | @s. de Masas Cocidas por hora | @s. de Mieles por hora | @s. de Azúcar Crudo por Hora |
|---|---|---|---|
| Spencer Tres Masas Cocidas Cristalización Meladura | 2,638 | 1,338 | 1,300 |
| Saladin Cuatro Masas Cocidas Cristalización Meladura | 2,562 | 1,262 | 1,300 |
| Webre Tres Masas Cocidas Semillamiento Completo de Miel | 2,314 | 1,014 | 1,300 |
| Proceso Mejorado Dos Masas Cocidas Semillamiento Completo de Miel con enfriamiento controlado de la Masa Cocida de Primera | 1,985 | 685 | 1,300 |

1 @ = 25 libras.

tachos al vacío ó fondant), de acuerdo con el Método de Gillett, en la proporción de 2.0 a 2.5 lbs. por cada 1,000 pies cúbicos de masa cocida á elaborar. El polvo debe ser bien mezclado con alcohol isopropílico, preferiblemente usando un agitador mecánico. Se alimenta el tacho con la miel de la masa cocida de primera (enfriada) hasta llenarlo y despues se hacen las operaciones de acuerdo con el equipo disponible: partiendo con otro tacho de agotamiento ó depositando piés cristalizados en los cristalizadores-graneros, &. Se elaboran las templas de agotamiento con una pureza entre 59-60 y se descargan á cristalizadores con equipos de enfriamiento forzado.

El semillamiento de la miel se hace una vez cada 36 á 48 horas, segun la capacidad de cristalizadores-graneros disponible. Los cristales de la magma para semilla tienen un tamaño de 0.4 milímetros que se desarrollan á 0.84 mm. en el azúcar comercial.

Esta técnica ha sido practicada durante cuatro zafras completas en un central azucarero de Cuba (Central Santo Domingo); por tres zafras en otro (Central Cuba), dos zafras en el Central Fajardo, por dos zafras en el Central Porfuerza refinando el 100% de sus azúcares crudos y por una zafra en el Central Río Cauto elaborando azúcar crudo especial muy seca para consumo animal.

Los puntos esenciales de éste proceso son los siguientes:— a) Purezas adecuadas de las masas cocidas; b) Enfriamiento rápido parcial de las masas cocidas á temperaturas pre-fijadas; c) Cristalizadores de Primera equipados con permutadores de calor de especificaciones y operación mejorados con el fin de obtener los resultados apropiados; y d) Re-calentamiento de las masas cocidas de primera á temperaturas pre-fijadas antes de la purga.

Con el propósito de mantener éste trabajo técnico dentro de la extensión fijada por las reglas del Congreso, no estamos incluyendo cifras detalladas sobre el balance de sólidos, evaporación y consumo de vapor de varios sistema de fabricación: Spencer, Saladin, Webre y el Proceso Mejorado de Dos Templas; pero éstos datos están á la disposición de las personas interesadas.

Las tablas siguientes muestran algunos de los datos más importantes:—

## Discusión

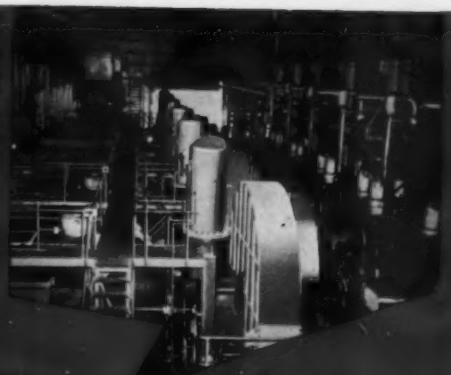
*M. A. del VALLE (Puerto Rico):* Está el nuevo sistema limitado á los ingenios que Vd. menciona; ó hay otros ingenios en Cuba usándolo tambien?

*M. A. MASCARÓ (Cuba):* Está usándose tambien en el Central Fajardo, en el Central Porfuerza (con Refinería) y en el Central Río Cauto, elaborando azúcar crudo especial muy seca para consumo animal.

*Mr. del VALLE:* Usan Vds. el antiguo

(*Sigue en la página* 60)

FLETCHER del Central Boca Chica, en la República Dominicana, compuesto de 18 mazas de 34" x 66", movidas por turbinas de vapor.

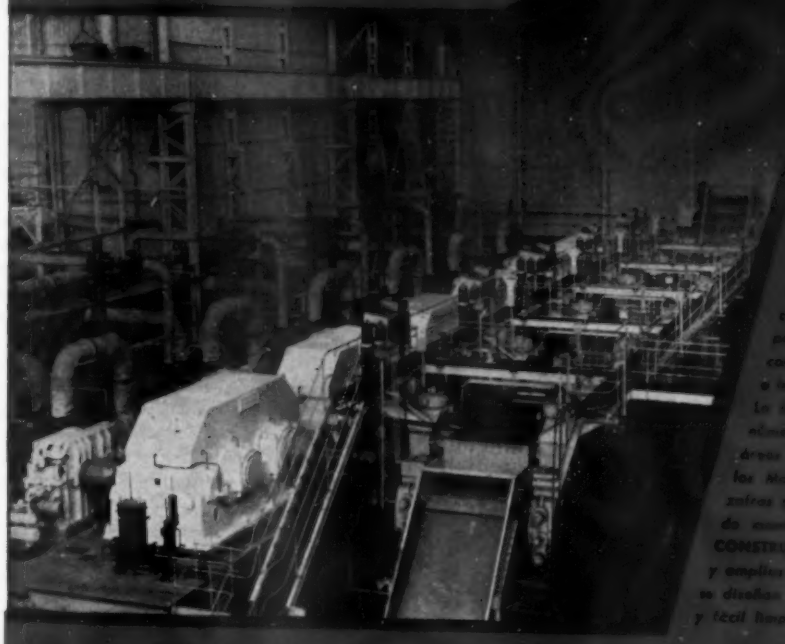


Planta de Molar FLETCHER en la fábrica azucarera de la Gangu Sugar Corporation, en Deoband, Provincias Unidas, India, compuesto de 18 mazas de 32" x 60", movidas por turbinas de vapor.

# FLETCHER

La última instalación FLETCHER de una planta de molar de 18 mazas de 34" x 66", movidas por turbinas de vapor e incluyendo los condensadores intermedios construidos de hierro dúctil de gama

## molinos para caña de azucar



Esta planta de molar es el resultado de más de 100 años de experiencia en la construcción de maquinaria azucarera—es el producto de discusiones, sobre el terreno, con los más distinguidos tecnólogos azucareros e ingenieros de molinos de caña en todo el mundo. La indudable superioridad de este equipo y el número de instalaciones realizadas en todas las áreas azucareras justifican nuestra afirmación que los Molinos Fletcher pueden realizar los más duros zafras azucareras por muchos años con costos mínimos de mantenimiento. Los Molinos Fletcher, de CONSTRUCCION ROBUSTA, lubricación bien planificada y amplias superficies de fricción en los chumaceras, se diseñan además para ofrecer completa accesibilidad y fácil limpieza.

La firma FLETCHER realiza instalaciones completas de fábricas de azúcar de caña y de azúcar de remolacha—También refinerías de azúcar—Modernización de fábricas existentes—Ampliaciones—Reparaciones—Equipos para Lavar Caña—Cuchillas de Cortar Caña—Desfibradores Maxwell—Molinos Fletcher—Tambores de Metal Atlas, especial para molinos—Mazas Maxwell Bonagna para pesar líquidos—Calentadores de Jugo—Clarificadores Fortier—Filtros-prensas—Evaporadores con Tubo Central Salado—Tachos al Vacío de corriente central—Bombas de Vacío y de Gas $CO_2$—Cristalizadores Fletcher—Bombas "Amarilla", rotativas por desplazamiento, para masas cocidas y líquidos viscosos—Equipos para Manejo de Azúcar a Granel—

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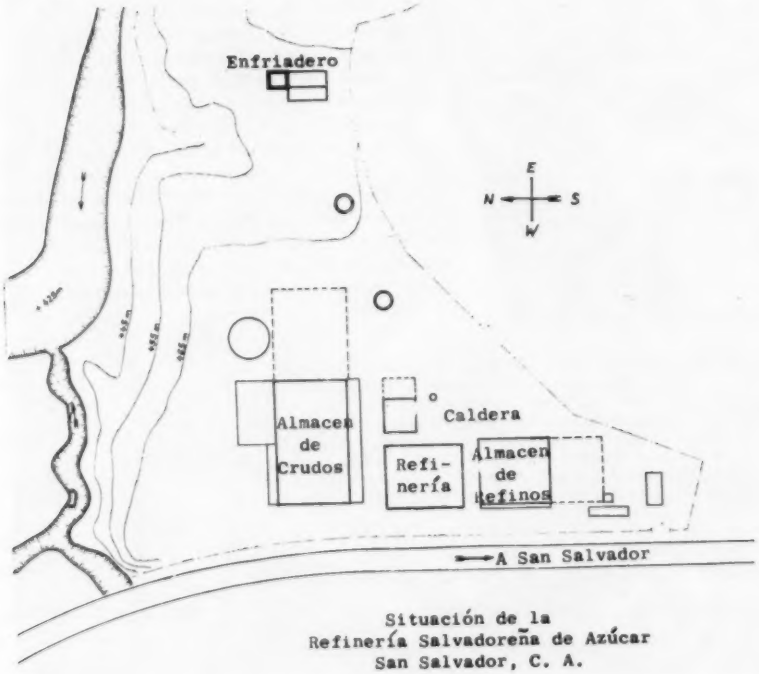
*Fig. 2*

# La Primera Refinería de Azúcar Independiente en la América Central


**por G. O. Winter**

**Ingeniero-Jefe Maschinenfabrik Buckau R. Wolf, A.G.**


*Fig. 1*




Situación de la
Refinería Salvadoreña de Azúcar
San Salvador, C. A.

La nueva refinería de azúcar en San Salvador, la capital de la República de El Salvador, está ya funcionando. Es de la propiedad y operada por la Refinería Salvadoreña S. A., una entidad cooperativa de los productores de azúcar crudo de la región. Su capacidad nominal es de 150 toneladas cortas de azúcar refino por día. Los constructores-contratistas fueron Maschinenfabrik Buckau R. Wolf, actuando como consultor técnico E. A. Rose, Inc., firma de ingeniería de Nueva Orleans. Esta es la primera refinería de azúcar que se construye en la América Central.

Debido á la escabrosidad del terreno las distintas estructuras no se pudieron construír integrando un grupo compacto. La Fig. 1 es un croquis del lugar. El edificio principal de la fábrica azucarera se muestra en la Fig. 2. El enfriadero para el agua de los condensadores se expone en la Fig. 3.

El azúcar crudo se recibe en un pañol de 92 x 158 pies con capacidad para 11,000 toneladas (Fig. 4). De aquí es pesada en una báscula "Toledo" de función automática y controlada eléctricamente. El azúcar cae después dentro de un mezclador ó "mingler" donde se liga con la corrida final de los productos de la refinería para formar un magma la cual se distribuye á las centrífugas de afinación; las cuales también reciben los azúcares A y B para ser afinados. Las centrífugas de afinación descargan directamente dentro de un tanque de disolución equipado con un agitador especial de alta velocidad y la descarga de cada centrífuga recibe automáticamente la cantidad necesaria de agua de disolución. Un instrumento regula y registra contínuamente la densidad del licor en ésta importante operación por su influencia sobre el consumo de vapor.

El equipo de centrífugas (Fig. 5) comprende dos centrífugas de afinación y tres centrífugas de refino, cada una con capacidad de 500 kilogramos ó 1,100 libras; y tres centrífugas de 350 kgs. ó 770 libras para productos intermedios. Estas centrífugas son movidas eléctricamente y operadas electro-automáticamente. Las correderas de alimentación son accionadas por mandos neumáticos por botón. Se descargan las centrífugas por arados azucareros operados á mano.

Debido al clima tropical la temperatura en la fábrica es muy elevada, por lo que todos los motores de las centrífugas están conectados con las salidas y entradas de un sistema de ventilación. Unas compuertas controladas eléctricamente cierran el aire exterior para cualquier motor de centrífuga que no esté trabajando.

Dos juegos de recipientes provistos de hélices agitadoras se utilizan para el manejo del licor de acuerdo con el proceso "Suchar" que comprende el uso de ácido fosfórico, lechada de cal, carbón activado y auxiliar filtrante diatomáceo. Los materiales para éstas operaciones están en

# El Nuevo Diseño de Crane Proporciona Mayor Fuerza a Las Válvulas de Bronce Sin Aumentar su Tamaño... Su Nueva y Fuerte Construcción Ofrece Mejor Alineamiento y Máxima Protección Contra los Esfuerzos Excesivos

Las válvulas Crane de bronce han demostrado ser siempre las mejores en su clase en las operaciones de los centrales azucareros . . . pero ahora han sido nuevamente diseñadas para hacerlas aún más eficaces y útiles.

El nuevo diseño cilíndrico del cuerpo—como el de las válvulas de acero de alta presión—provee mayor resistencia sin aumentar el peso, ofrece máximo refuerzo a las tensiones de la línea así como a la acción de acuñamiento del disco. Para dar aún mayor resistencia, el prensaestopas de estas válvulas se enrosca ahora *dentro* del casquete, y el contacto del vástago más alargado suministra mejor soporte, alineamiento más exacto y menos desgaste de la empaquetadura.

Averigüe cómo el nuevo diseño y la resistencia de las válvulas Crane de bronce pueden proporcionarle a Ud. un cierre más hermético, un funcionamiento más duradero y operaciones libres de dificultades. Llame al Representante Crane de su localidad hoy mismo.

**Válvula Crane de Bronce No. 438.** Tamaños: 0.6 cm. a 8 cm. Presiones de Trabajo: Hasta 125 libras de vapor saturado ó 200 libras de agua* a 93°C. Hasta 200 libras de aceite o gas a 66°C. *La clasificación del agua y del aceite no son de choque térmico.

*Crane International pone a su disposición las válvulas Crane desde la fuente de producción preferida por Ud.—ya sea por precio, ubicación geográfica o servicio.*

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*Fig. 5*

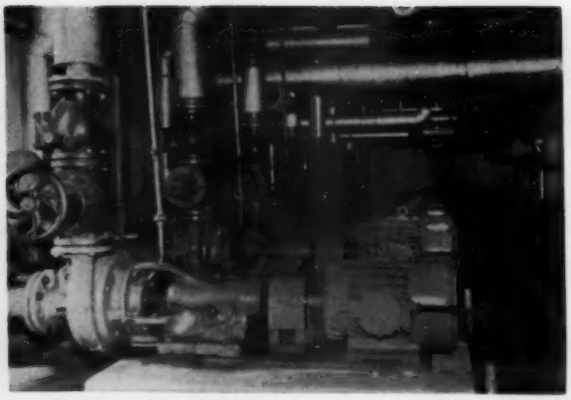


*Fig. 6*

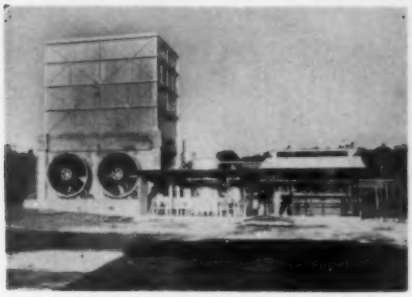


*Fig. 3*

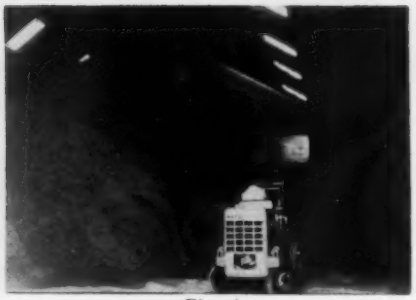


*Fig. 4*

un almacén anexo á los recipientes de agitación y mezcla. Debajo de éstos tanques de tratamiento hay una larga fila de bombas centrífugas, cuyos motores al igual que los demás de la refinería, son completamente cerrados y enfriados por ventiladores. (Fig. 6).

Dos Clarificadores "Jacobs" hacen la clarificación preliminar de los licores y realizan parte del trabajo de los filtros principales. Estos clarificadores preliminares están conectados á un sistema de "auto-filtración" en el cual las impurezas remanentes tales como carbón decolorante y otras son eliminadas con la ayuda de auxiliares filtrantes.

El "auto-filtro" tiene adjunto un filtro de seguridad "Industrial" con tubos de papel de filtrar. Entre éste departamento y el de evaporación y cristalización hay otro control-registrador contínuo para la densidad del licor filtrado

Se han instalado dos tachos al vacío para refino, cada uno con capacidad para 22 toneladas de masacocida. Además otro tacho similar para las templas A y B de crudos y un tacho de 11 toneladas para las templas de agotamiento (Fig. 7). Se obtiene el vacío mediante condensadores de chorros "Koerting" (Fig. 8). En los tachos de refino elaboran cuatro templas seguidas. Después de purgadas, el azúcar refino es secado y enfriado en un secador rotativo y los cuatro tipos de azúcar refino son depositados y separados en cuatro silos con capacidad para 18 á 25 toneladas cada uno. Se extrae el azúcar de éstos silos en ciertas proporciones para hacer las ligas que permitan integrar un sólo azúcar refinado standard. Despues de eliminar los terrones el azúcar refino vá al departamento de envase donde una báscula automática "Toledo" la pesa y envasa en sacos de 100 libras. Esta máquina es operada foto-eléctricamente de modo que no es necesario ningun otro control de la operación de pesar. Los sacos se cosen por una máquina "Union Special."

El almacén de refino está equipado con aire acondicionado para contrarrestar la condensación de la humedad del aire durante la época de las lluvias.

El vapor se genera por una caldera de radiación "Buckau-Wolf" completamente automática, usando petróleo crudo como combustible y generando 22 toneladas/hora de vapor á 230 psig y á 705°. Fahrenheit. La fuerza eléctrica es suministrada por un turbo-generador de 1,000 KW.

Después de la instalación de los edificios y del montaje del equipo la planta quedó sujeta para su aceptación por los propietarios á una prueba por 30 días demostrativos de la producción, el consumo de vapor, la eficiencia de las calderas y el rendimiento en azúcar. Este período de pruebas dió los siguientes resultados:

(*Sigue en la página* 60)

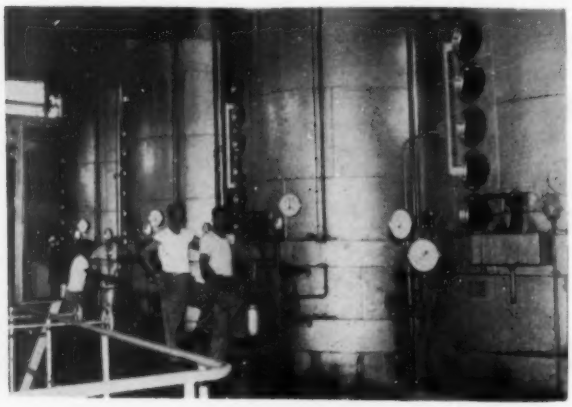


*Fig. 7*

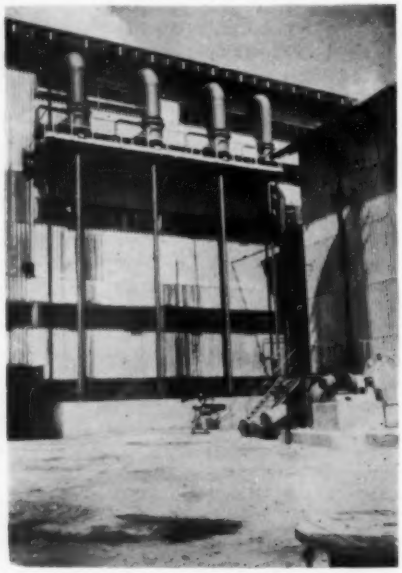
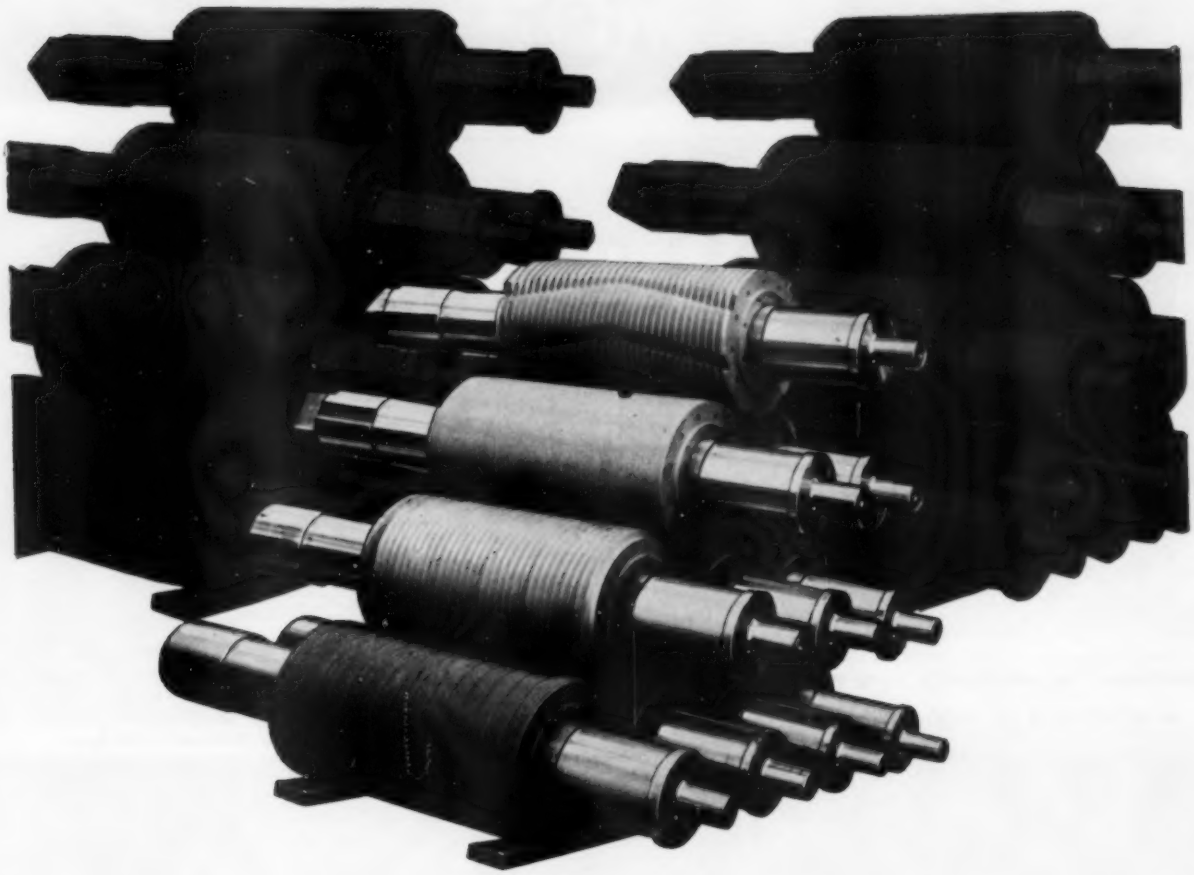


*Fig. 8*

# "GRANO"

## MAZAS DE MOLINOS AZUCAREROS CON SUS EJES



**Reproducción de una fotografía de Mazas "Grano" equipadas con sus ejes.**

**Los ejes ó guijos son de acero forjado para satisfacer las necesidades, y las mazas ó tambores están fuertemente ajustados á los ejes.**

**Somos primeros promotores en el desarrollo de metales especiales para Mazas de Molinos Azucareros y nuestra experiencia é investigaciones durante los últimos 45 años nos capacita para entregar, con la más completa confianza, mazas y tambores que llenan exactamente todas las condiciones exigidas para la molienda moderna de la caña de azúcar.**

**La Maza de Molino Azucarero ideal es aquélla, que según se usa, presenta á la caña una superficie granular al mismo tiempo abierta y dura, de modo que la maza no solo muerda y agarre la caña, sino que al mismo tiempo posea gran duración y no se pulimente. Los tambores de mazas hechos de nuestro metal "Grano" tienen éstas características y lo han demostrado en los diversos países productores de azúcar.**

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# Los Operadores Confian En Las Plantas De Moler de SERVICE FOUNDRY

Años de experiencia en el diseño y construcción de plantas completas de moler caña y sus componentes le han ganado á la Service Foundry una envidiable reputación en la industria azucarera. Las fotografías en éstas páginas ilustran algunos de los bien conocidos centrales azucareros que usan equipos Service Foundry. Muchos han sido nuestros clientes por 25 años ó más.

Por estar establecida en el corazón de la Zona de Azúcar de Caña de los Estados Unidos y muy próxima al área del Caribe, la Service Foundry es una fuente lógica para sus necesidades en la planta de moler. Escriba, telefonee ó cablegrafíe hoy.

LEIGHTON FACTORY, Thibodaux, Luisiana, Sr. Irving E. Legendre, Sr. Administrador General. Engranes de acero cortados por Service Foundry

CORA TEXAS FACTORY, White Castle, Luisiana, Sr. H. A. Rousseau Ingeniero. Engranes y chumaceras de la Service.

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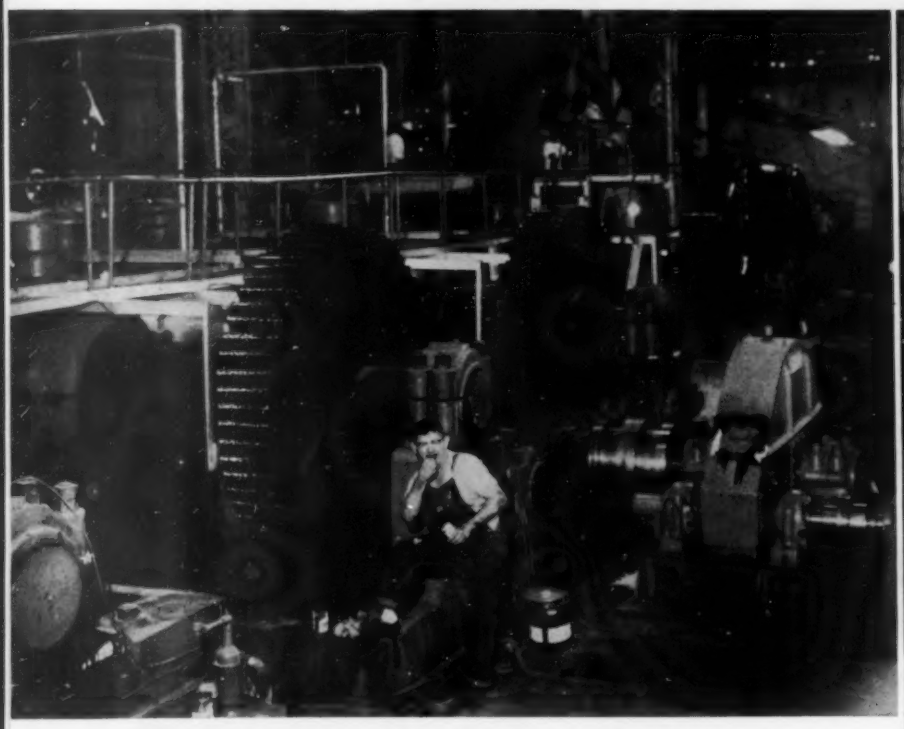
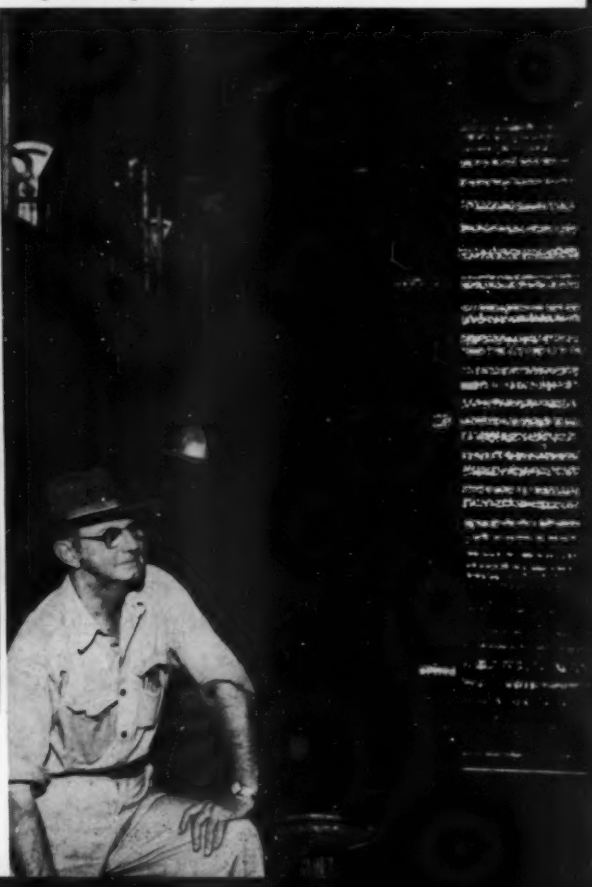
- FACILIDADES DE PRODUCCIÓN ESPECIALIZADAS



CEDAR GROVE, White Castle, Luisiana, Sr. L. Calliet, Ingeniero. Primero y cuarto molinos de Service Foundry.

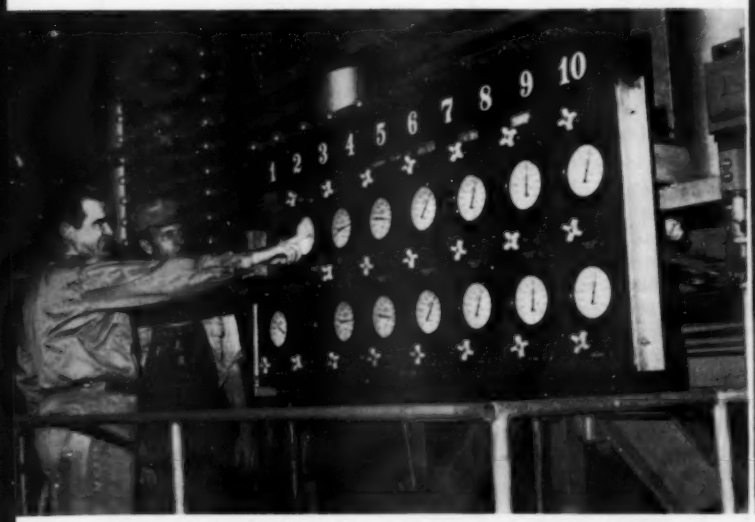


WESTFIELD FACTORY, Paincourtville, Luisiana, Sr. Walter Aucoin y Sr. Charles C. Savoie, Vice-Presidente. Coronas y bancazas de la Service.

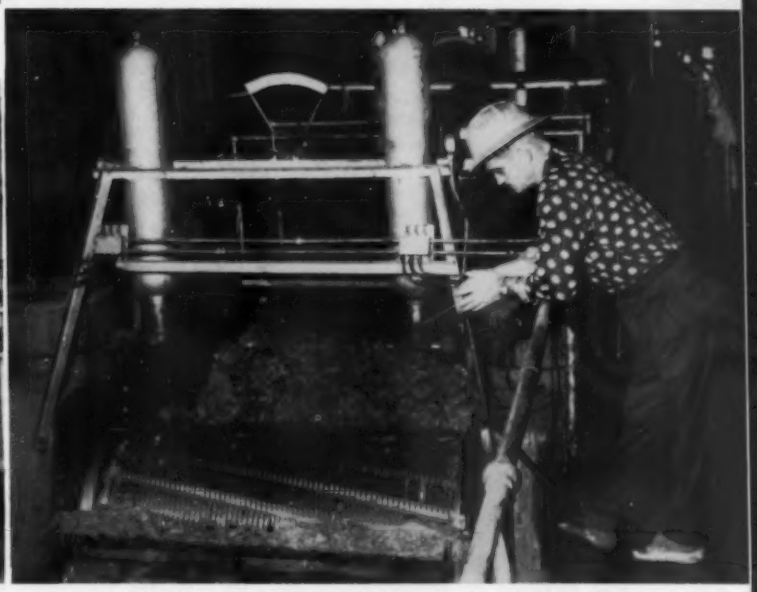
LULA FACTORY, Belle Rose, Luisiana, Sr. Patrick Cancienne, Ingeniero y Sr. Maver Landry. Engranes cortados de la Service Foundry.

MYRTLE GROVE, Plaquemine, Luisiana, Engranes principales y piñones de la S.F., 1960.

CALDWELL SUGARS CO-OP, Thibodaux, Luisiana, Sr. Victor J. Bailliet, Administrador del central azucarero. Cuatro molinos movidos por engranes cortados S F.




GLENWOOD, Napoleonville, Luisiana, Sr. L. Suarez, Ingeniero. Vírgenes ó Pedestales, Bancazas y Engranes de acero cortados por la Service.



DUHE & BOURGEOIS, Jeanerette, Luisiana, Sr. C. L. Blanchard, Ingeniero, Sr. J. P. Duhe. Vírgenes de acero, tapas superiores de presión, tapas laterales, chumaceras seccionales de bronce, chumaceras superiores é inferiores por la Service Foundry.

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**Una División de la Avondale Shipyards, Inc.**

CABLE: "SERFDRY"

## Extractos del Reporte

(*Viene de la página* 50)

sistema de Dos Templas como lo hacemos en Puerto Rico? En Puerto Rico el sistema de Dos Masas Cocidas es bastante corriente; pero nó mejorado en la forma sugerida por Vds.

*Mr. MASCARÓ:* En Cuba usan Tres, Cuatro y hasta Cinco Templas. Ningun ingenio utiliza el antiguo sistema de Dos Templas. Nuestro Sistema Mejorado de Dos Templas se está usando bajo completo éxito en los centrales citados. La lentitud en extenderse se debe á que la legislación existente no permite recompensar adecuadamente la mayor recuperación por más alta eficiencia. Todas las mejoras para más alta eficiencia exigen inversiones en equipos y servicios.

*M. H. TANTAWI (Egipto):* Cual es la pureza de la Magma-Semilla? Cuánto tiempo de retención? Enfrían Vds. la masa cocida de segunda? Cual es la pureza de las mieles finales?

*Sr. MASCARÓ:* La pureza de la magma de semilla es alrededor de 85-87. El tiempo de retención para el enfriamiento rápido de las templas de primera es de una hora; á veces menos. Enfriamos la masa cocida de segunda, que es la masa de agotamiento, á 100 grados Fahrenheit; depende de la temperatura del agua de circulación. Por los reportes puede Vd. observar 33 de pureza aparente. Dependiendo de la pureza inicial de los jugos.

*M. MOHAN (India):* Cual es la pureza del azúcar de bajo grado?

*Sr. MASCARÓ:* Alrededor de 90.

*C. H. McALISTER (Hawaii):* Cual es la viscosidad de sus masas cocidas de agotamiento?

*Sr. MASCARÓ:* No hemos hecho ensayos de laboratorio para precisarla. Pero positivamente es menor que la viscosidad de las masas cocidas de agotamiento de los procesos de tres y cuatro templas. Los motivos son obvios.

*Sr. McALISTER:* Particularmente yo me estaba refiriendo á la viscosidad entre cañas cortadas á corto tiempo y á largo tiempo. Vds. tienen en Cuba un corte cada año; nosotros tenemos dos años en Hawaii. Vds. tienen centrífugas que purgan el azúcar de agotamiento en 11 minutos mientras que en Hawaii necesitamos 45 minutos.

*Sr. MASCARÓ:* Por el corte cada dos años, por la cosecha mecanizada, por mayor cantidad de grano en las templas de agotamiento y por mas bajas purezas en jugos y masas cocidas de agotamiento, ciertamente Vds. requieren mucho más tiempo de purga en las centrífugas.

*G. A. GEMMELL-SMITH (Australia):* Una elevación de pureza en las cañas los obliga a Vds. á ir de dos á tres masas cocidas? Si es así, á que nivel de pureza hacen el cambio? Si no es así, qué pureza de mieles finales están dispuestos á aceptar?

*Mr. MASCARÓ:* A base de una pureza alrededor de 85 en la meladura ó menos Vd. puede hacer con eficiencia todo el trabajo con dos templas. Si la pureza de la meladura sube a 86-88 nosotros inyectamos alguna miel primera á las templas de primera. Por haber ventajas preferimos hacer éso antes que ir a tres masas cocidas. Si la pureza de la meladura es de 89-90 ó más, estimo que Vd. debe ir al sistema de tres templas.

*K. DOUWES-DEKKER (So. Africa):* Cual es la pureza del azúcar de la masa cocida final, con la cual hacen la magma de semilla?

*Sr. MASCARÓ:* Alrededor de 90.

*Sr. DOUWES-DEKKER:* Con qué líquido mezclan el azúcar para hacer la liga ó magma?

*Sr. MASCARÓ:* Usamos miel ó meladura.

■

## La Primera Refinería

(*Viene de la página* 52)

Rendimiento de refino: el 94.3% del azúcar crudo derretido, el cual tenía 97.24 de polarización, 0.75% de invertidos y 0.53% de cenizas.

Azúcar refinado standard elaborado: 99.95 de polarización, 99.98 de pureza, 0.03% de humedad y 0.46 de color (Lovibond).

Consumo de vapor: 174 libras por cada 100 libras de azúcar crudo.

Eficiencia de la caldera: 86.8%.

Consumo de fuerza: 600 KW para una producción diaria alrededor de 155 toneladas.

Agua requerida: alrededor de 30 galones por cada 100 lbs. de refino.

Al juzgar éstos valores debe tenerse presente que fueron obtenidos durante un período de prueba; y por tanto es de esperarse sean mejorados según el personal gane en experiencia.

■

## Resistencia de las Plantas á las Enfermedades

Científicos del Departamento de Agricultura de los Estados Unidos han descubierto que la presencia ó ausencia en una planta de una proteína idéntica á la contenida en un organismo morboso puede explicar la susceptibilidad ó resistencia de dicha planta á esa enfermedad ú organismo morboso. Los estudios realizados por los científicos muestran que éste era el caso en plantas susceptibles ó resistentes á diferentes géneros del hongo tizón Melampsora lini. Las plantas susceptibles á un género en particular contenían una proteína que había sido encontrada en dicho género; mientras que las plantas resistentes nó. El descubrimiento proporciona la evidencia de la naturaleza de la resistencia fisiológica de las plantas y señala el camino hácia nuevos métodos de multiplicación para eliminar las enfermedades.

CONTROL

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Elecsa, S. A., Apartado 4618

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**República Dominicana**
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Dr. Martin Strominger
Apartado 4392, Chacao

# En el ingenio azucarero... el Centro de Control de Motor Unitrol elimina los problemas de corrosión

El Ingenio Azucarero Central Plata, en Puerto Rico, utiliza en sus operaciones el resistente y confiable Unitrol—los centros de control de motor standard con una gran resistencia a la corrosión.

Aunque el Unitrol no se ha diseñado especialmente para evitar la corrosión, la alta calidad de sus materiales le confieren suma resistencia a la corrosión y al moho. Las bobinas, por ejemplo, están impregnadas de plástico epóxico, las cubiertas se han bonderizado, los acabados son de esmalte calcinado, muchas de las piezas están bañadas en cadmio, y los contactos verticales son de plata gruesa.

El Control Cutler-Hammer se ha diseñado para largos años de intenso servicio . . . y el Unitrol está planeado a fin de que proporcione el máximo de control en un espacio mínimo. Hoy día, en que existe una creciente línea de arranques y accesorios Cutler-Hammer, los usos del Unitrol se han multiplicado.

Obtenga informes concretos sobre el Unitrol Standard que posee una alta resistencia a la corrosión. Comuníquese con uno de los distribuidores que aparecen en la página opuesta.

El nuevo Unitrol 8-Hi comprende 8 unidades de control. El máximo de control en el mínimo de espacio.

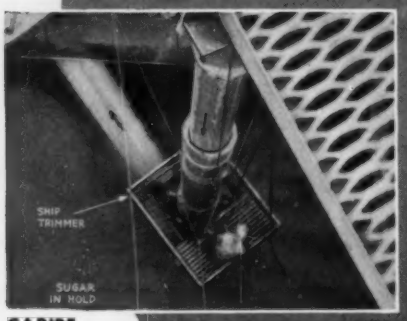
*¿ALGO NUEVO? DIRIJASE A . . .*

**CUTLER-HAMMER**

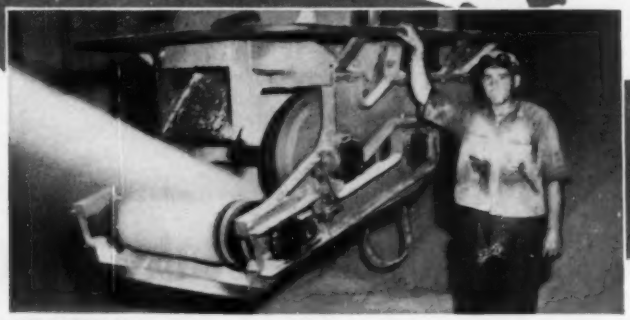
CONTROL

International C.A. 270 North Twelfth Street, Milwaukee 1, Wisconsin, E.U.A. • Dirección Cablegráfica: CUTLER-MILWAUKEE

# *STEPHENS-ADAMSON REDUCE LOS COSTOS DEL MANEJO DE AZUCAR A GRANEL EN EL MUNDO ENTERO




CARIBE



SUDAMERICA

PACIFICO

En el mundo entero se maneja más azúcar a granel con equipo STEPHENS-ADAMSON que con ningún otro. Por más de dos décadas, la pericia ingenieril ha sido la fuerza motivante detrás del puesto a la vanguardia en la industria azucarera que STEPHENS-ADAMSON ocupa.

Este puesto reconocido ha colocado a los ingenieros de STEPHENS-ADAMSON en asociación estrecha con virtualmente cada tipo de problema relacionado con el manejo de azúcar a granel.

Para el almacenaje y la recuperación a granel, así como para la carga y arrumaje de barcos, STEPHENS-ADAMSON reduce los costos del manejo a granel y el tiempo en el muelle a un mínimo . . . Los ingenieros de STEPHENS-ADAMSON pondrán mayores beneficios en su operación del manejo de azúcar a granel. Escriba solicitando amplios detalles.

* *STEPHENS-ADAMSON desarrolló los primeros conjuntos lanzadores centrífugos que revolucionaron el manejo de azúcar a granel. Este principio se utiliza en los Arrumadores de Barcos STEPHENS-ADAMSON que se ilustran más arriba.*

ENTERESE HOY COMO STEPHENS-ADAMSON PUEDE REDUCIR LOS COSTOS DEL MANEJO DE AZUCAR A GRANEL PARA USTED . . . ESCRIBA SOLICITANDO DETALLES

S-A®
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REPRESENTANTES, DISTRIBUIDORES Y ARREGLOS PARA LA FABRICACION EN LOS PRINCIPALES MERCADOS DEL MUNDO

# GRUPOS ELECTROGENOS DIESEL ALLIS-CHALMERS

## generadores confiables de fuerza eléctrica para la industria azucarera

Los grupos electrógenos Allis-Chalmers han establecido la reputación de no tener igual en cuanto a lo económicos y dignos de confianza que son, y se usan extensamente en regiones donde no hay abastecimiento de fuerza eléctrica o no es práctico su empleo.

Se utilizan asimismo como equipos de emergencia en hospitales, hoteles, edificios de oficinas, fábricas y almacenes para garantizar servicio continuo en caso de que se interrumpa el abastecimiento de fuerza comercial.

Unicamente la Allis-Chalmers fabrica grupos electrógenos completos—modernos motores diesel, generadores del tipo sin escobillas de eficiencia probada, reguladores eléctricos y cuadros de distribución. Construcción coordinada y responsibilidad en un solo fabricante asegura los mejores resultados.

Los grupos electrógenos Allis-Chalmers poseen estas características sobresalientes:

**Arranque rápido** — en 8 a 18 segundos funcionan con plena carga.

**Generadores sin escobillas** — sin anillos colectores, ni escobillas, ni conmutadores que se desgasten.

**Regulación automática del voltaje**—sin contactos ni piezas movibles. No hay piezas que se quemen. Responden con rapidez a cambios súbitos del voltaje.

**Se instalan fácilmente** — de tipo unitario, montados sobre fuertes patines. No se requiere ninguna base especial. Las conexiones eléctricas simplificadas permiten reducir los costos adicionales.

ALLIS-CHALMERS INTERNATIONAL, Departamento AZ361, Milwaukee 1, E.U.A.

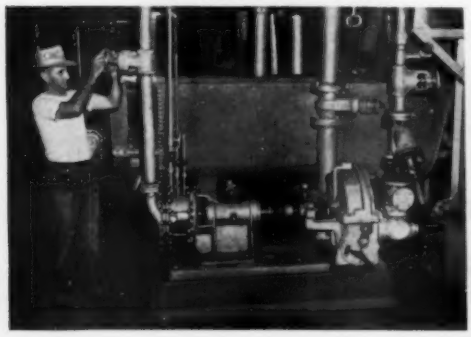
**ALLIS-CHALMERS**

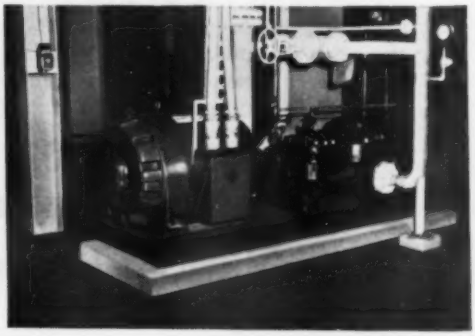
FABRICANTES DE MAQUINARIA DESDE 1847

**Bombas.** La Allis-Chalmers puede abastecer la industria azucarera de bombas que se adapten a toda condición de temperatura, corrosión o abrasión.

**Transformadores y Equipos de Distribución de Fuerza** de todos los tamaños standard. Subestaciones completas.

**Motores y Controles** para todas las operaciones de centrales azucareras . . . con detalles eléctricos y mecánicos para usos específicos.





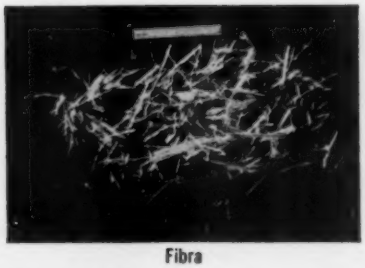
El nuevo 'Jeep' Traveller es resistente y está siempre listo para el servicio. Transporta 8 pasajeros adultos o una gran carga extra de 100 pies cúb. La maciza construcción del 'Jeep' y la excelente economía de gasolina mantienen a un *mínimo* los gastos de operación y reparación. El estilo moderno, la tapicería de vinilo y la combinación de la pintura de dos colores le dan al Traveller apariencia universalmente llamativa. Examínelo hoy mismo en el establecimiento de su concesionario 'Jeep'.

**Pruebe el 'Jeep' Traveller manejándolo usted mismo**

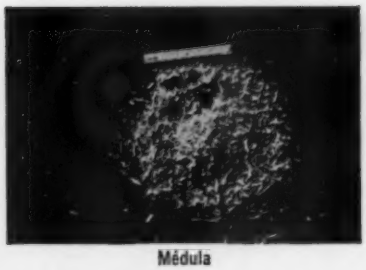
'Jeep'®

**Willys-Overland Export Corporation, Toledo 1, Ohio, E. U. A.** INDUSTRIAS KAISER

Bagazo

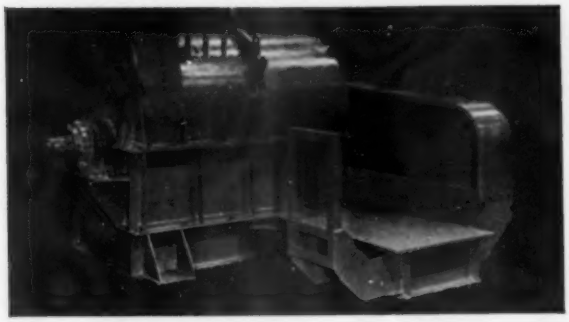


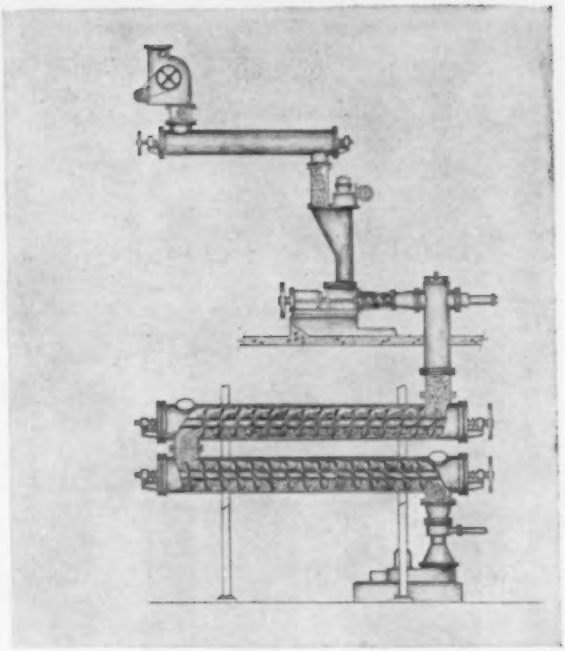
Fibra



Médula

**Nueva pareja que permitirá la producción de pulpa de bagazo de alta calidad a un costo más bajo**





## El Desmedulador "Horkel"

El Desmedulador "Horkel", ideado por la Universidad de Louisiana y distribuido exclusivamente por Parsons & Whittemore, ofrece una segura solución económica a un problema que ha puesto límites al valor del bagazo como materia prima para la producción de papel.

Al hacer posible la separación de gran parte de la médula e impurezas en la central azucarera, el Desmedulador "Horkel" permite la producción de fibras limpias aumentando en esta forma la capacidad en el digestor hasta en un 20%. La desmedulación reduce el embalaje, los gastos de manejo, proporciona economías en los productos químicos requeridos para la cocción y blanqueo (generalmente consumidos por la médula) y disminuye los problemas de mantenimiento en la fábrica de papel.

## El Digestor Continuo "Pandia" (Chemi-Pulper)

El Digestor Continuo "Pandia" (Chemi-Pulper) ofrece todas las ventajas de una rápida operación y un estrecho control de la calidad, en un sistema de producción continuo que permite la elaboración de pulpa de bagazo (o de cualquier otro material celuloso) de alta calidad.

El alimentador compactador y el alimentador sinfin que esta unidad posee solucionan el problema relacionado con el natural volumen del bagazo, permitiendo una mayor cantidad de material por pié cúbico de capacidad en el digestor.

El uso de alta presión y temperatura permite la producción de pulpas blanqueadas o completamente blanqueables y de gran resistencia, en 10 minutos o menos. El consumo de vapor, labor y productos químicos es bajo.

Para informes sobre el Desmedulador "Horkel", el Digestor Continuo "Pandia" (Chemi-Pulper), o cualquier otra maquinaria para fabricar pulpa y papel, sírvase escribir a nuestra oficina más cercana.

**THE PARSONS & WHITTEMORE / LYDDON ORGANIZATION**

*Primeros en el mundo en el desarrollo de fábricas de pulpa para utilizar las fibras existentes en cada país.*

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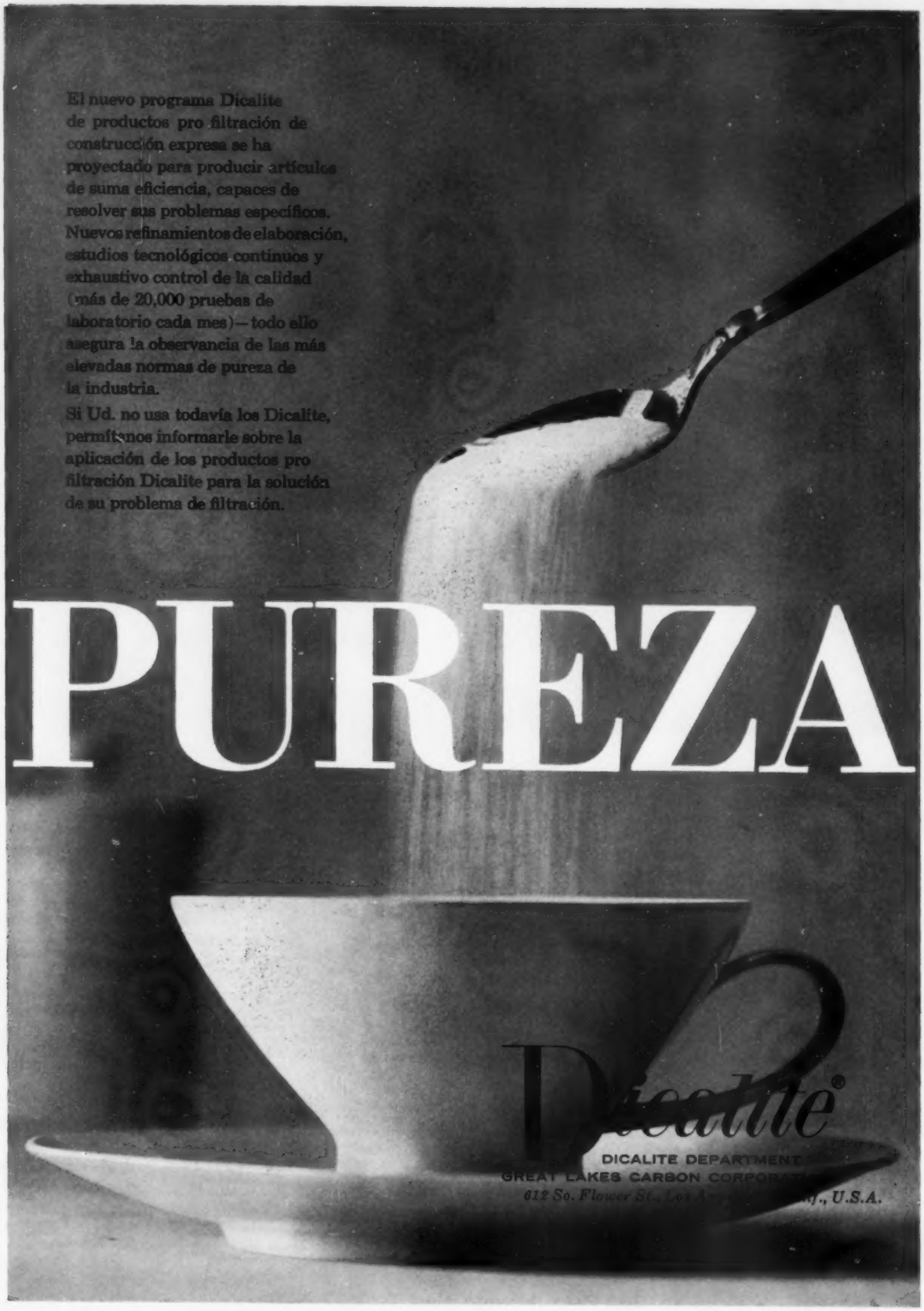
El nuevo programa Dicalite de productos pro filtración de construcción expresa se ha proyectado para producir artículos de suma eficiencia, capaces de resolver sus problemas específicos. Nuevos refinamientos de elaboración, estudios tecnológicos continuos y exhaustivo control de la calidad (más de 20,000 pruebas de laboratorio cada mes)—todo ello asegura la observancia de las más elevadas normas de pureza de la industria.
Si Ud. no usa todavía los Dicalite, permítanos informarle sobre la aplicación de los productos pro filtración Dicalite para la solución de su problema de filtración.
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**AUMENTE SU PRODUCCION**

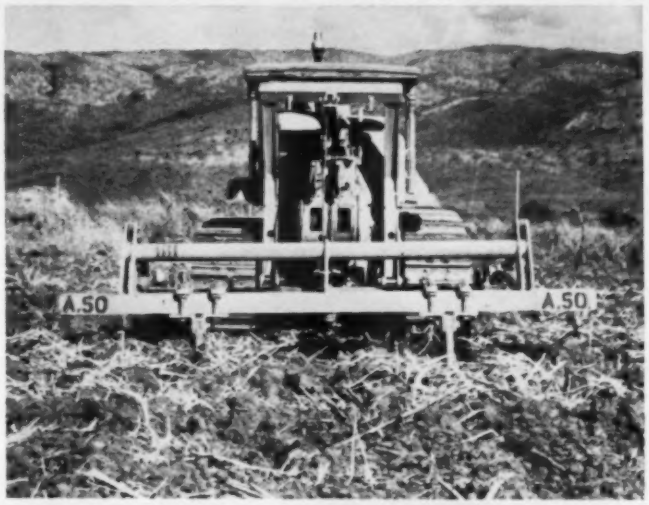
# 3 pasos para obtener mejores cosechas de caña de azúcar

En el Estado de Aragua, en Venezuela, se están mejorando los campos en forma inteligente y económica para asegurar mejores cosechas de caña de azúcar. Se siguieron los siguientes pasos:

**1.** Un **Tractor D4 Caterpillar** con un arado de discos, mezcla el residuo de la cosecha con la tierra. Se retarda el crecimiento de malas hierbas, se mejora la estructura de la tierra y, de esa manera, se puede controlar en forma más uniforme las temperaturas. En terrenos arcillosos se reduce la compactación y la tendencia a agrietarse.

**2.** Trabajando la tierra a una profundidad de 76 cm., un **Tractor Caterpillar D8** con barra portaherramientas y subsoladores construídos por Rome Plow Co., mejora el drenaje y permite un desarrollo normal de las raíces.

**3.** El campo es nivelado en forma rápida y precisa con una **Motoniveladora Caterpillar No. 12.** El drenaje superficial se aumenta considerablemente y la irrigación se hace más efectiva facilitando de esa manera los cultivos.



**Su Distribuidor Caterpillar** tendrá mucho gusto en mostrarle su línea de equipo de alta calidad para agricultura, conservación de terrenos y mejora de campos. No deje de visitarlo pronto.

Caterpillar Tractor Co., Oficinas Generales, Peoria, Illinois • Caterpillar Americas Co., Peoria, Illinois • Caterpillar Overseas S. A., Ginebra • Caterpillar of Australia Pty. Ltd., Melbourne • Caterpillar Brasil S. A., São Paulo • Caterpillar Tractor Co. Ltd., Glasgow • Caterpillar of Canada Ltd., Toronto

**CATERPILLAR**

Caterpillar y Cat son Marcas Registradas de Caterpillar Tractor Co.

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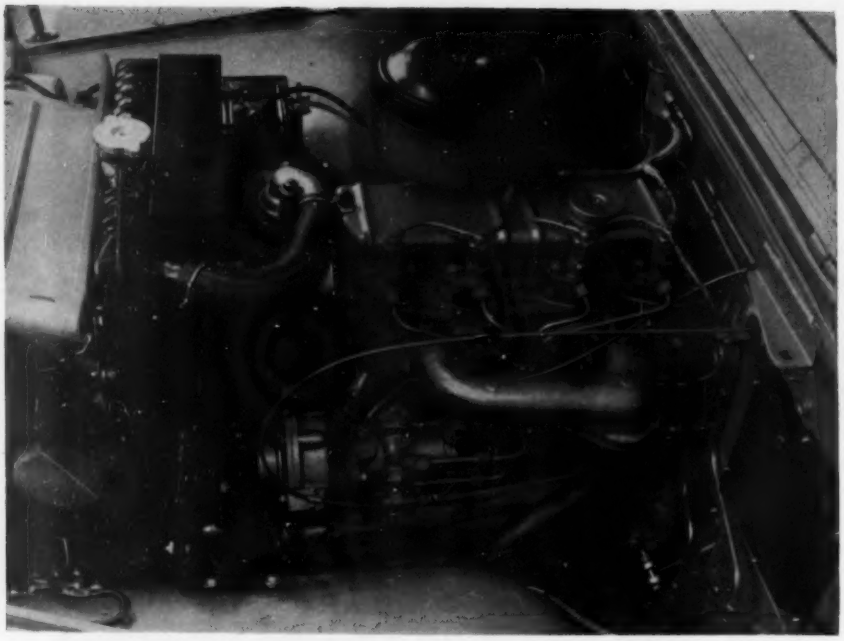

*En una conferencia de prensa celebrada en Nueva York se exhibió el motor diesel Perkins instalado en un "Jeep" con propulsión en las cuatro ruedas; anunciándose que éstas unidades con fuerza motriz diesel estaban ya disponibles para exportación. Han sido diseñados para trabajo rudo y bajos costos de operción y mantenimiento en regiones azucareras extranjeras y en otras áreas.*

## "Jeep" con Fuerza Motriz Diesel Disponible

En una conferencia de prensa celebrada en Nueva York el primero de Febrero de 1961 se anunció que se encuentran disponibles para la venta tres modelos de exportación de los vehículos "Jeep," con propulsión en las cuatro ruedas y con un nuevo motor diesel construído por el Grupo Perkins de Inglaterra. Conocido como el modelo Cuatro-192, los diesel Perkins se pueden obtener en los modelos de exportación "Jeep" Universal CJ-5 y CJ-6 y en los camiones de recogida de una tonelada. No obstante su costo inicial ligeramente más alto, los motores diesel ofrecerán á los cultivadores de caña y á los operadores de centrales azucareros ventajas marcadas por menores costos de operación y mantenimiento, en aquellas áreas donde el combustible diesel es más barato y más fácil de conseguir que la gasolina.

Los vehículos "Jeep" de éstos modelos tienen un peso bruto entre 3,750 á 6,000 lbs., y son distribuídos para exportación por Willys-Overland Export Corporation y Willys Overseas S. A.

El motor diesel Perkins desarrolla 62 hp. á 3,000 rpm. y tiene un desplazamiento en pistones de 192.4" cúb. Estas cifras comparan con el motor á gasolina "Hurricane" con 72 hp. á 4,000 rpm. y un desplazamiento de 134.2" cúb. El máximo momento torsional en el diesel es de 143 pies-lbs. á 1,350 rpm. Los motores diesel Perkins se encuentran en uso en 166 países alrededor del mundo en una amplia variedad de servicios.

■

## Koffsky Habla en el Club Azucarero

"La tarea de forjar una política azucarera es muy difícil en éste mundo tan mutable. Es complicada por los intereses creados introducidos en el pasado, por decisiones que deben hacerse con respecto al papel de Cuba en el futuro en nuestro mercado de azúcar, por la impaciencia de nuestros productores domésticos bajo controles de cuota —particularmente el gran deseo de nuevas áreas por entrar en el mercado, por las grandes esperanzas de abastecedores extranjeros por participar en lo que éllos consideran un mercado atractivo y por las numerosas facetas de nuestra política exterior", dijo Nathan M. Koffsky, al hablar ante el Sugar Club durante el almuerzo celebrado el 16 de Febrero en Nueva York. El Congresista Harold D. Cooley, presidente del Comité de Agricultura de la Cámara de Representantes, presentó á Mr. Koffsky, quien á su vez es presidente del Grupo sobre Estudios Azucareros del Departamento de Agricultura de los Estados Unidos. El reporte emitido por éste Grupo de Estudios (véase página 47), ha despertado gran atención por su posible influencia sobre la ley azucarera que reemplazará la presente Acta Azucarera, que expira en Marzo 31.

## La Cosecha de Remolacha en la USRR: 50 Millones de Toneladas

De acuerdo con una declaración hecha por la Embajada Soviética en Washington, los expertos rusos estiman en 50 milliones de toneladas la cosecha de remolacha azucarera para 1960. Dicna producción se ha obtenido en un área de tres millones de hectáreas aproximadamente. El promedio de rendimiento por hectárea ha sido de 17.2 toneladas. El anuncio de la Embajada dice que las operaciones de cosechar han sido rápidamente mecanizadas utilizando unos 35,000 equipos éste año.

■

## Resúmen de Noticias Azucareras Cubanas

La produccion azucarera de Cuba en 1960 ascendió á 5,688,859 toneladas largas españolas, equivalentes á 5,861,800 toneladas métricas; 287,371,395 galones de mieles finales. Segun el ICEA las existencias de azúcar físico en Noviembre 15 ascendían á 1,745,624 toneladas largas españolas.

Las exportaciones totales de azúcares, crudos y refinos, valor en crudos para diez meses de 1960, hasta Octobre 31 fueron: 4,648,137 toneladas largas españolas. Cifras similares corresponden á varios años anteriores: 4,776,409 en la misma fecha en 1953, 4,648,224 en 1956; 4,756,951 en 1957 y 4,949,545 en 1958.

El precio promedio del azúcar crudo para el año fué de 3.43 cts. libra; ó sea 21 puntos por debajo de 3.64 cts. fijados provisionalmente para pagar las cañas á los colonos. Y 127 puntos, ó 1.27 cts., por debajo del precio ó tipo de congelación de los salarios. Segun informes oficiales ésta diferencia ha representado una pérdida de $22,000,000 absorbida por el Gobierno para no perjudicar á los obreros y pequeños colonos.

Existe la creencia de que la Zafra de 1961 pudiera ser de 6,000,000 de toneladas largas españolas; y aún más, debido á la cantidad de caña que, aparentemente, hay en los campos.

Hasta Noviembre 30, 1960 la produccion de Alcohol Absoluto alcanzó á 176,909,159 litros y la de Alcohol Natural á 49,846,158 litros.

Otra importante noticia, segun *Cuba Económica y Financiera*, es la relativa al problema, objeto de discusiones desde hace más de treinta años, sobre la necesidad de reducir el número de ingenios en activo, eliminando aquellos que por sus condiciones de equipos, situación geográfica ú otras causas, resultan ineficientes; y dejando existentes solo aquellas unidades industriales azucareras que puedan producir á precios que permitan la competencia. Este cambio, que no se sabe cuando empezará á efectuarse se hará sin perjudicar a los trabajadores; pues la intención es crear al menos las fuentes de trabajo equivalentes á las que se eliminen. Un central azucarero de la zona de Manzanillo, Provincia de Oriente, no molerá en 1961.

**NORIT® SUPRA**

*para mejor azúcar refinado*

NORIT

UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND

# Extractos de Publicaciones Azucareras

**Publicados bajos los Auspicios de la**

**Sociedad Internacional de Tecnólogos Azucareros de Caña**

**por Arreglo Especial con**

**SUGAR y AZÚCAR—Profesor Mario A. Mascaró, Redactor**

## Agronomía

### Efectos de la Fumigación del Suelo en el Crecimiento de la Caña de Azucar

H. T. CHU Y T. K. TSAI, *Reporte de la Estacion Experimental Azucarera de Taiwan,* No. 20, pp 73-90 (1959)

Trabajos anteriores habían demostrado que la fumigación del suelo aseguraba mejor crecimiento y mas alto rendimiento de la caña de azucar; y esta conclusión ha sido confirmada por ulteriores experimentos en los cuales se usaron cuatro clases distintas de productos para la fumigación del suelo: mezcla D-D, Ortho-fume 85, clorofina y formalina. Se aplicaron sobre cañas de siembras de Primavera y Otoño, en cinco plantaciones representando distintos tipos de suelos y por un período de dos años. Se notaron los efectos del tratamiento sobre el crecimiento y rendimiento y sobre la cantidad de nemátodos en el suelo. El producto fumigante más efectivo fué el Ortho-fume 85, que dió aumentos en el rendimiento en algunos casos por encima del 20%, sobre siembras de primavera y otoño. El conteo de nemátodos mostró grandes aumentos, aún con la formalina, la cual no se considera fatal para los nemátodos; lo cual sugiere que pueda tener un efecto letal sobre otras plagas microscópicas. Los mayores porcentajes de aumento en los rendimientos se encontraron en las áreas donde los suelos eran arenosos o margas arenosas. En todos los casos el porciento de estacas de siembra germinadas fué por encima de 90.

■

### Nuevo Concepto En Preparacion De Terrenos Con Tractor De Carriles Y Arado-Rastra

*Por* OVIDIO GONZÁLEZ, *Reunión Anual de los Tecnólogos Azucareros de Puerto Rico en 1960*

La renovación de grandes extensiones de retoños de caña por los productores de Puerto Rico en los dos últimos años 1959 y 1960 envolvía tres aspectos principales a saber: económico, agrónomico y factor tiempo. El uso de tractores de carriles del tamaño Caterpillar D7 con arado-rastra Rome de 10 discos de 36", con ancho de corte de 7 piés y profundidad de 12" a 14" ha reducido hasta 50% el costo de las tareas de preparación del terreno antes de surcar.

La sección trasera de cinco discos corta o cruza a 50° el corte de la sección delantera sin alterar el perfil del suelo. A la vez mezcla uniformemente la paja de caña, retoños o materia orgánica sin necesidad de quemarlas. La escasez de terrenos cultivables en Puerto Rico no permite en la caña de azúcar una rotación de cultivos adecuada y desde el punto de vista agronómico debe mantenerse el perfil del suelo evitando traer a la superficie el subsuelo.

Con este equipo, cuya producción promedio es de dos (2) cuerdas de aradura por hora, se logra renovar grandes extensiones de siembras en corto tiempo antes de que llegue el período de lluvias excesivas. En esta forma se hacen las siembras en el tiempo apropiado y se alarga el período de crecimiento de la caña para mayor producción.

■

### Control del Borer de la Caña de Azucar con Endrin

W. H. LONGETAL, *Sugar Bulletin,* Vol. 38, No. 16 (1960)

El volúmen de datos acumulados demuestra concluyentemente que Endrin es el mejor producto químico para el control del Borer de la caña de azucar, si se compara con cualquier otro de los ensayados hasta ahora. Por esta razon es el único insecticida recomendado por la Estación Experimental Agrícola de Luisiana.

Cuatro aplicaciones bi-semanales de Endrin granular al 2% esparcidas a razón de 12 libras por acre han dado muy buen control de la segunda y tercera generación de borers o perforadores de la caña. El promedio de costo total de cuatro aplicaciones de Endrin granular, desde aviones, fue ligeramente menor a $10.00 por acre. Las operciones se hicieron en 1958. Este costo significa que el cultivador necesita obtener un aumento ligeramente mayor de una tonelada de caña por acre para pagar el costo del tratamiento. Los datos reportados incluyen un aumento promedio en los rendimientos fluctuando entre 6 a 11 toneladas de caña por acre despues de hacer los tratamientos con Endrin.

■

## Tecnología

### Ensayos con Hidrociclones sobre el Jugo de la Segunda Carbonatación

O. ASP., *Comunicacion de la Swedish Sugar Corporation,* Serie II, No. 4 (1959)

En 1958 se instaló en la fábrica de Skivark una batería de cinco Hidrociclones para separar los lodos o cachazas precipitados en la segunda carbonatacion. Estos equipos son de un tipo especial, construídos en Estocolmo bajo permiso de la Nichols-Freeman de los EE. UU. y han trabajado en la forma mas satisfactoria. Este tipo de Hidrociclon esta integrado por un cilindro superior y un cono inferior con angulo relativamente amplio. Dentro de la parte superior del cilindro principal hay otro cilindro mas corto que se extiende parcialmente hacia abajo. El material entra tangencialmente y a gran presion por arriba, de manera que todo el líquido gira a alta velocidad.

La salida del jugo purificado es por arriba y los lodos o cachazas se concentran y salen por el fondo; y el cilindro interior ya descrito previene que el jugo purificado y la cachaza se mezclen. La eficiencia del sistema es tal que quedan muy pequeñas cantidades de partículas sólidas que puedan incrustar

las superficies calóricas y las tuberías. Cada uno de los Hidrociclones tiene capacidad para 410 litros por minuto. Cuatro quintas partes de la cachaza se devuelve a la segunda carbonatación y la otra quinta parte al primer sedimentador concentrador. La velocidad de sedimentacion del equipo es 280 veces mayor que la de un sedimentador-concentrador trabajando por gravedad. El jugo permanece solamente alrededor de dos segundos en el cilindro.

■

## Eliminacion de los Sólidos en Suspension del Jugo Mixto por el Dorr Cyclone

P. G. WRIGHT, *Proceedings Queensland Society of Sugar Cane Technologists*, Vol. 26, pp. 177-182 (1959)

En una serie de pruebas en escala completa se encontró que un hidrociclón (Dorr Cyclone) de seis pulgadas, trabajando con jugo mixto alimentado a 20# psig de presión, fué capaz de manejar 60 galones por minuto y extraer sobre el 90% de la arenilla mas gruesa que 150-malla, o el 50% de la arenilla total. La corrida inferior o subálvea, que es alrededor del 1% del total del jugo, se pasa a un cono de sedimentación de 4 x 5 pies (con unos 150 galones de capacidad) en el cual se remueve la arenilla y se lava hasta dejarla libre de contenido de azucar. Por regla general las arenillas mas gruesas que 250-malla se extraen eficazmente, entretanto que las particulas más finas se quedan en la corrida superior. No obstante se insiste en que el residuo mas molesto para la fábrica es la arenilla de 150-malla; y el 90% de ésta es eliminada.

En una fábrica que muela 150 toneladas por hora se requerirán unidades con 106 pulgadas para manejar todo el jugo mixto. Alternativamente, un juego de tres unidades de 12-pulgadas (el cual cuesta solo la mitad de seis unidades) sería suficiente, aunque la extracción de arenilla sería menor. Sin embargo, éstas unidades mayores eliminan materias hasta 200-malla; y si se considera el costo inicial y de mantenimiento, resultan preferibles las unidades mayores bajo el punto de vista económico.

■

## Uso del Polarímetro Zeiss Automático (0.05 S) en la Industria Azucarera.

I BECKER, *Zucker*, No. 15 pp. 257-7 (1959)

El nuevo polarímetro automático Zeiss con tubo a flujo, fúe investigado durante la campaña de 1958 por el Instituto Alemán de Investigaciones de la Remolacha Azucarera. Este instrumento, en lugar de estar basado en medidas visuales, emplea un sistema de medición de las propiedades eléctricas de la luz. Esto ofrece la ventaja de eliminar todos los errores subjetivos: las medidas u observaciones hechas por varias personas concuerdan todas.

La construcción de este instrumento es bastante complicada; pero su operación es tan sencilla que cualquier persona ordinaria, despues de breve instruccion, puede operarlo. No se usa tubo de polarización y en su lugar se coloca una célula de flujo-a-través en la cual pueden ensayarse las muestras de jugo azucarado de remolacha, una trás otra. En cinco minutos pueden hacerse diez análisis. Con un instrumento por operación visual, aún una persona bien entrenada, dificílmente puede hacer la mitad de dichos análisis en el mismo tiempo. Los resultados pueden ser registrados automáticamente, eliminándose así las disputas o controversias entre los cultivadores y los laboratorios. Otra gran ventaja del instrumento a base de las propiedades de la luz eléctrica es la de ser muy poco afectado por muestras cuya turbidez o color no pueden ser polarizadas con un aparato del tipo visual.


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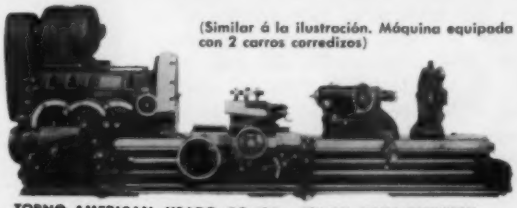

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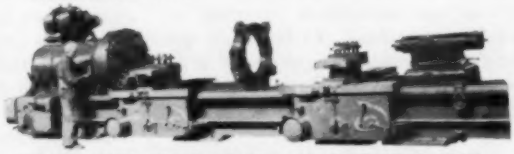

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## El Azúcar en la Industria del Petróleo

Dentro de las perforaciones de los pozos, con el fin de mover las bombas hidráulicas, se envía aceite á presión á través de tuberías de una pulgada de D. I., ahusadas á tres cuartos de pulgada de diámetro interior. En corto tiempo éstas tuberías se recubren con una capa de parafina y tienen que ser limpiadas. El equipo de perforación tiene que estar parado mientras se limpian éstas tuberías. Un sistema recientemente patentado permite limpiar éstas tuberías insertando bolas de azúcar duro (candy), las cuales son empujadas bajo presión á lo largo de los tubos limpiando la parafina sin paralizar la operación del pozo. Las bolas de azúcar candy duro se ajustan dentro de la tubería en su tramo de una pulgada; cuando han llegado al tramo siguiente de tres cuartos de pulgada de diámetro, se han disuelto lo suficiente para encajar ajustadamente. Finalmente, los restos de las bolas de azúcar quedan retenidos por un colador en las bombas hasta resultar enteramente disueltos.

## El Hon. Ellsworth Bunker Hablará ante la S.I.T.

La Vigésima Reunión Anual de los Técnicos de la Industria Azucarera (S.I.T.), será honrada con un discurso que pronunciará el Honorable Ellsworth Bunker en el banquete que se celebrará en la noche de Mayo 8, segun anuncia G. E. Waring, presidente de la citada Asociación. Mr. Bunker auna un cabal conocimiento de la industria azucarera con una experiencia universal en diplomacia internacional. El hecho de que tan distinguida persona sea el orador principal en la próxima reunión es digna culminación de más de veinte años de servicios de la S.I.T. á la industria azucarera, y de cierta manera compendia la reciente tendencia de la organización hácia un carácter más internacional.

El Sr. Bunker es altamente conocido en los círculos azucareros como antiguo presidente de la Junta de Directores de la National Sugar Refining Company. Tambien ha sido director de Central Aguirre de Puerto Rico, Guantánamo Sugar de Cuba y Potrero de México. Tales antecendentes hacen del Sr. Bunker una autoridad incuestionable en la industria azucarera; pero tal

*Hon. Ellsworth Bunker*

vez es aún de mayor importancia actual su experiencia diplomática. Desempeñó el cargo de Embajador de los EE. UU. en la Argentina en 1951, Embajador en Italia en 1952, Representante de los EE. UU. ante la Asamblea General de las Naciones Unidas y Embajador en la India en 1956.

Una medida de la proyección internacional del prestigio de los Técnicos de la Industria Azucarera lo dá el hecho de que sus miembros é invitados tendrán el privilegio de oir un mensaje de Ellsworth Bunker en el banquete anual que se efectuará en la noche del día 8 de Mayo, en relación con la Vigésima Reunión Anual en Nueva York, Hotel Sheraton Atlantic, Mayo 7 al 9 inclusives de 1961. Se espera que la asistencia excederá la de otras reuniones, con delegados de varios países extranjeros y un gran grupo de los EE. UU., para oír y discutir trabajos técnicos de importancia inmediata para los refinadores de azúcar á través de todo el mundo así como un symposium al final de la reunión que tratará un importante tema: "Instrumentación y Control de los Tachos al Vacío en la Cristalización de la Sacarosa".


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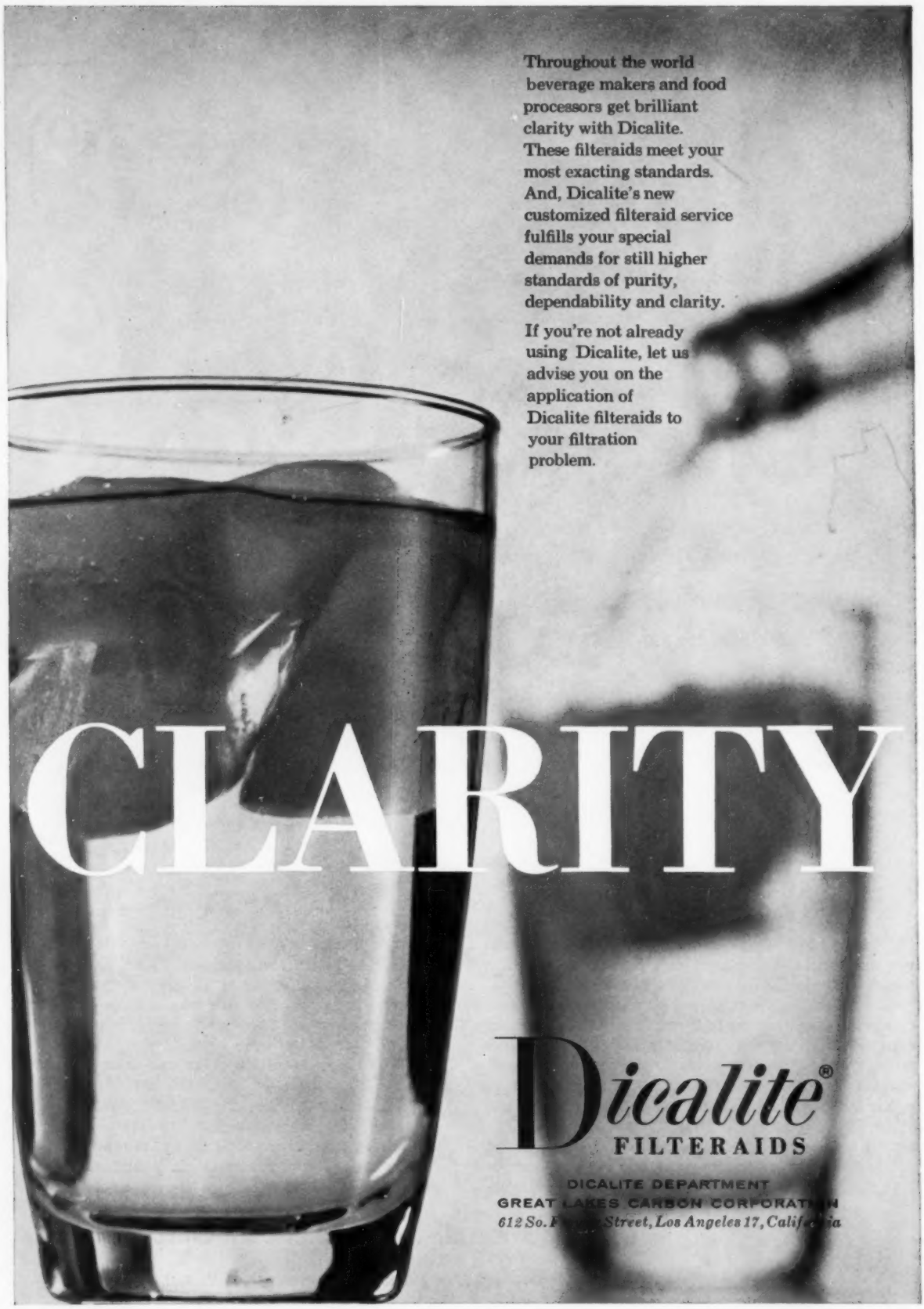
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